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Local Anesthesia in Operative Dentistry.

By Leo Stern, D.D.S., Dental Clinician, Vanderbilt Clinic (Roosevelt Hospital).

(Illustrated with pen drawings made by the author.)

Although numerous papers describing the technique of conductive and infiltration anesthesia have made their appearance in the dental journals of the past year, no adequate emphasis has been laid, it seems, on the scope and applicability of this aid to dental practice. The result has been that the average practitioner has not felt sufficiently encouraged to study the principles of the procedure and make them a part of his professional equipment.

It is far from my intention to belittle the comments of other writers on the subject. Much valuable material has been presented and a great deal of enthusiasm aroused—almost enough, in fact, to make the popularity of conductive anesthesia for oral surgery assume the proportions of a fad. It would not be superfluous, however, to outline the technique of local anesthesia in a manner sufficiently simple and lucid to enable the reader to follow it in a practical way, together with an indication of its wide scope and its possibilities as applied to the routine of daily dental practice. The directions and explanations in this article have been given in terse language for the sake of directness, but they are sufficiently comprehensive, it is believed, to serve as a guide in studying the subject.

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Local Anesthesia.

Local anesthesia, with its modern perfection of detail and technique, comes so close to being the panacea for the relief of all dental pains that it deserves the careful consideration of every progressive member of the profession.

Too little, in my estimation, has been said in regard to its applicability in alleviating the pain incident to the average dental operation. In addition to the profound anesthesia which it affords for purely surgical interferences, I have found it to be invaluable for obtaining absolute relief from pain in a surprisingly miscellaneous list of operations. These include:

- Ι. Preparation of all types of sensitive cavities.
- 2. Extirpation of pulps.
- 3. Grinding and shaping of abutments for crown and bridgework.
- Scaling and planing pyorrhetic roots. 4.
- Anesthesia of pericemental diseases, including alveolar abscess, enabling painless opening into the pulp chamber to relieve congestion.
- Prophylaxis of inflammatory conditions (according to the method of Dr. Riethmüller), including hyperæmia of the pulp.

The formula for unqualified success in these procedures is to adopt and practice an exact technique and never to deviate from it. technique it is my purpose to describe, being in all essentials that perfected by Dr. Guido Fischer, of Marbury, Germany.

Importance of Maintaining Asepsis.

The foremost requisite is to observe every precaution that will maintain asepsis. It is impossible to overemphasize the fact that everything should be sterile—the hands of the operator, the mouth of the

patient, the instruments used and the solution to be injected. cleanliness must be maintained. Many untoward sequelæ which have been confounded with and described as the toxic action of novocain, are traceable directly to imperfect asepsis.

The base or dilutant of the solution must be strictly isotonic. Normal salt solution has been sup-The Solution. planted by the use of the Ringer base, which minimizes post-operative pains, chiefly by virtue of its calcium content, which seems to exert therapeutic effects. A formula for such a solution follows:

Sodium chlorid5 Calcium chlorid04 Potassium chlorid02 Aqua destillata 100.

Ringer tablets are now obtainable and are very convenient for making up a stock solution. The addition of these tablets to sterile distilled



water should be made in the proportion of ten tablets to 100 c.c. of water, gently heated in an absolutely sterile porcelain dish and kept in a dropping bottle that will protect its sterility (Fig. 1), and serve to have it always ready for use.

For obvious reasons, no more anesthetizing solution is to be made up than is necessary for immediate use. Pour 3 c.c. of Ringer solution

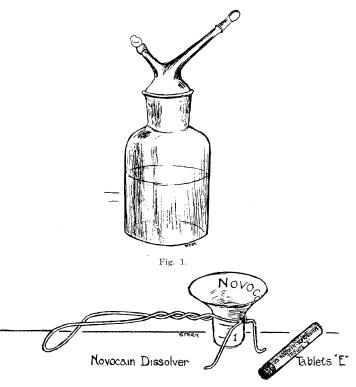


Fig. 2.

into a clean porcelain novocain dissolver (Fig. 2) and warm over an alcohol flame. Three tablets E of novocain-suprarenin (Farbwerke, Hoechst Co.) are added, and the liquid boiled; resulting in a two per cent. novocain solution. The entire dish should then be placed aside under a large brown glass cover to protect it from light and dust until the operator is ready. If any discoloration of the solution is observed it should be rejected, as this signifies staleness of the suprarenin contained, and a new solution prepared.

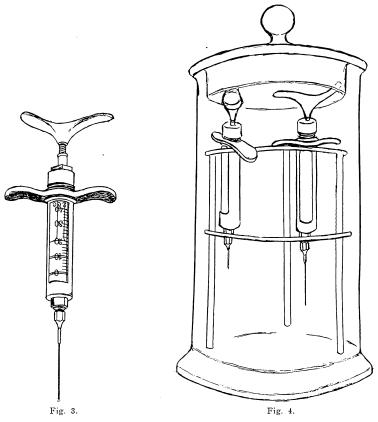
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The Syringe and its Care.

The best syringe to use is that designed by Dr. Fischer for the purpose (Fig. 3). It is made entirely of metal and glass and it is easily taken apart for boiling. Its capacity is forty minims.

Nothing but iridio-platinum needles should be used, of two lengths—42 mm. and 23 mm., for conductive and infiltration anesthesia respectively. Two syringes should be kept on hand, equipped with each size needle respectively.

After use, the syringes are to be cleaned by drawing into them a mixture of alcohol, three parts and glycerine one part, and should be



suspended in a jar of the same solution when not in use (Fig. 4). Before filling a syringe with novocain solution it should be freed of alcohol by forcing boiling distilled water, uncontaminated by soda or any other chemical in, and of it several times. As an added precaution the tip of the platinum needle is heated to redness in the alcohol flame, after which the syringe may be filled.

Preparatory to the injection it is of great importance to ascertain the exact condition of the mouth by examination. In cases where the patient observes proper care of the oral cavity, simply spraying with a mild an-



tiseptic solution such as peppermint water (U.S.P.) is sufficient. Where general oral unhealthiness presents, however, it is advisable first to thoroughly swab the soft tissues with hydrogen peroxide diluted to one-half strength.

Before touching the patient, the forearms, hands and finger nails of the operator should be thoroughly scrubbed with tincture of green soap, rinsed, and immersed in a 1-5000 solution of mercuric chloride for several minutes.

Many of these details may seem trifling or superfluous, but the writer has found, upon experimentation, that variation usually means partial or complete failure, both in the profundity of the anesthesia and the prevention of the post-operative pains, not to speak of the danger of infecting the patient. Each step is important and must be followed to the letter. With the use of a little intelligence in arranging conveniently the apparatus described, and after a little practical experience, the technique will become automatic. It is always simplest to learn correctly.

Anatomy of Nerve Foramina.

Before entering into a description of the technique covering the actual operation of injection, it would be well to consider briefly the anatomic structure of the parts to be anesthetized and their rela-

tionship to the location of the nerves supplying them.

The maxillæ present a characteristic cancellous structure. Examination discloses numerous perforations on both facial and lingual surfaces. These structural arrangements facilitate the penetration of the injected fluid to the nerve supply of the teeth, and it is for this reason that simple infiltration of a novocain solution is sufficient to produce anesthesia of the upper teeth.

The mandible is far more compact in structure than the maxillæ and its alveolar process is thicker. The minute perforations are absent with the exception of a few in the region of the anterior teeth. Nerve blocking is therefore a necessary procedure in anesthetizing the lower teeth.

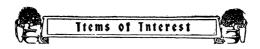
The entire dental apparatus is enervated by the trifacial, or fifth cranial nerve, which divides into three branches: the opthalmic, the superior maxillary and the inferior maxillary. These branches are all sensory* and therefore transmit every painful impression of the region.

The distribution of the last-named divisions is important.

The second, or superior maxillary division, terminates in the infraorbital nerve, giving off numerous branches in its course. Of these, the superior dental nerves are of interest to us. The middle and posterior superior dental nerves supply the alveolar process and the posterior teeth.

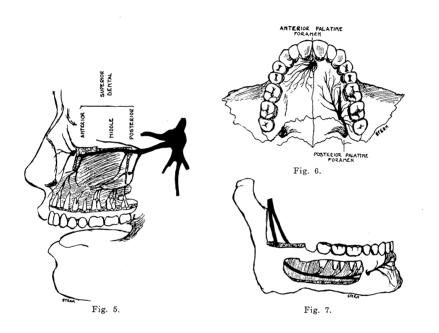
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^{*}The inferior maxillary nerve, of course, contains motor filaments.



The infra-orbital branch emerges from the infra-orbital foramen sending off branches which supply the oral mucosa, the floor of the noze and the anterior teeth (Fig. 5).

The anterior portion of the palate is ennervated by the naso-palatine nerve which emerges from the incisive or anterior palatine foramen (Fig.



6), while the posterior portion is supplied by the anterior palatine nerve emerging from the posterior palatine foramen opposite the second molar (Fig. 6). These nerves anastamose in the bicuspid region.

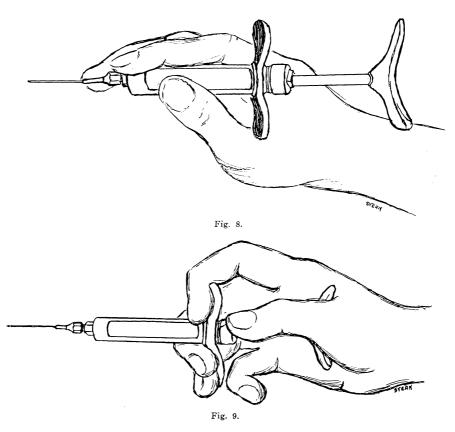
Complete anesthesia of each maxilla may, then, be obtained by injecting the novocain solution in the four foramina enumerated, namely, the infra-orbital and posterior dental foramina bucally and the anterior and posterior palatine foramina lingually. These procedures block the transmission of any sensation in the upper jaws. The modus operandi of these injections will be detailed below.

The inferior maxillary division of the fifth nerve supplies the entire lower jaw (Fig. 7). Its inferior dental branch enters the mandible through the inferior dental foramen, which is situated on the inner surface of the ramus, about 1.5 cm. above the last molar. This nerve sends off a few



filaments from the mental foramen which anastamose with the nerve of the opposite side.

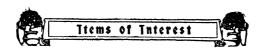
Lingually the tissues are likewise supplied by a large branch situated in front of the inferior dental nerve; the lingual.



These ennervations are most important, and the operator should thoroughly familiarize himself with the areas of distribution before attempting to block the nerves supplying these areas.

Syringe Grips. It is of advantage to practice holding the syringe in the correct manner. To insure delicacy of touch and accuracy in placement it should first be grasped as one would a pen (Fig. 8). The needle should be carefully inserted and settled in the correct location without the use of any force whatsoever.

Once in place, the barrel should be steadied with the left hand while the right engages the plunger in a pistol grip (Fig. 9) and the fluid very



slowly injected. Delicacy of touch is the all-important qualification in securing accuracy and positive results, and should be carefully cultivated.

As previously mentioned, local anesthesia may be produced by either of two methods: infiltration anesthesia or conductive anesthesia.

Infiltration anesthesia is produced by forcing the novocain solution through the porous structure of bone, whence it eventually penetrates to the nerve supply of the part and thus paralyzes the sensation of a restricted area.

Conductive anesthesia is a more complicated procedure in that it involves the operation of locating the superficial point in a nerve trunk

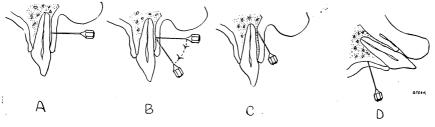


Fig. 10.

supplying a comparatively large area and passing the injecting needle into or very near it, thus, by direct action of the anesthetic at that point blocking the sensory terminations of that nerve.

Infiltration anesthesia is especially applicable to the upper teeth and to the lower anterior teeth.

Conductive anesthesia is indicated in the lower posterior teeth, in infections (abscess, pyorrhea, etc.), and where it is desirable to anesthetize a large number of teeth. Combinations of the two methods are frequently indicated.

Infiltration Anesthesia.

Because of the comparative simplicity of its technique, the infiltration method of anesthesia will be considered first.

Upper Anterior Ceeth. Spray the mouth thoroughly with an antiseptic solution. Always use the left hand to draw away the cheeks and lip. Paint the area of the mucosa to be injected liberally with the following solution, which

sterilizes the point of injection, and further, serves to dull the pain of inserting the needle:

By Tincture Aconite.

Tincture Iodine.

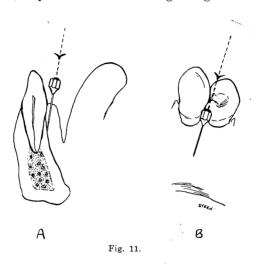
Alcohol, Absolute, equal parts.

This may be accomplished conveniently by the use of absorbent cot-



ton twisted over the end of a wooden applicator. Throughout the operation the left hand should remain placed. The syringe to which the short (23 mm.) needle is affixed, having been sterilized and filled, should be grasped in the first, or pen position. Heat the tip of the needle to redness.

Holding the syringe delicately, allow the needle, its orifice turned towards the bone, to pierce the tissues at right angles to the long axis of



the tooth and at a point about halfway between the apex and the gingival margin of the root (Fig. 10a). Work deliberately and cautiously. As soon as the bone has been reached, change the direction of the needle until it points towards the apex of root (Fig. 10b), and then, with the application of a minimum of force, slide the needle upwards and inwards until the point is judged to be opposite the apical foramen (Fig. 10c). Change now to the pistol grip and inject 7% of the barrel of fluid very slowly and evenly. Fully two minutes should be given to inject this quantity of solution.

Withdraw the needle carefully and massage the tissue, a procedure which aids the penetration and distribution of the anesthetic. As a control to the accuracy of the technique, if the injection has been properly made, a gradually spreading area of anemia will be observed to radiate from the point of insertion as the fluid enters the tissues. This is caused by the action of the suprarenin on the superficial blood capillaries and indicates, to a degree, the extent of the anesthetized area.

Direct the patient to open the mouth to its full extent. Determine a spot lingually along the central axis of the tooth about one-third the

distance below the apex. Paint the area with the iodine solution, heat the point of the needle to redness and pierce the tissues to the bone at an angle of about forty-five degrees to the tooth, employing the pen grasp (Fig. 10d). Change to the pistol grip and slowly inject the fluid remaining in the barrel.

In ten minutes the tooth may be worked upon and the anesthesia will last at least three-quarters of an hour, after which it disappears gradually.

Upper Posterior Ceeth.

The inclination of the needle must be changed from a right angle to an acute angle, owing to the interference of the cheek. If several adjacent teeth are to be anesthetized, the needle should be allowed

to advance in a horizontal direction along the bone, injecting the fluid continuously with its penetration.

Lower Anterior Ceeth.

The infiltration of the lower teeth presents no marked difference in procedure. The direction of the needle, however, is changed to one just diverging from the parallel (Fig. 11a). Lingually the injection

is made between the teeth (Fig. 11b), entering mucosa near the gingival margin and sliding the needle directly downwards.

As a conclusion to the subject of infiltration, a modification of Fischer's enumeration of points to be observed in generalized technique is given:

- I. Asepsis obtained and preserved.
- 2. Isotonia of solution.
- 3. Sterilization of mucosa.
- 4. Quieting any nervousness on part of patient.
- 5. Two injections, one buccally and one lingually.
- 6. Orifice of sterile iridio-platinum needle pointed towards bone.
- 7. Slow injection with strong pressure.
- 8. Massage of mucosa to distribute solution.
- 9. Wait of ten minutes during which preparations for operating may be made.

Conductive Anesthesia.

By far and more satisfactory a method of anesthetizing the teeth from the standpoint of the operative dentist, in that it avoids all danger of injury to the pulpal tissues, lasts longer and is less painful, because the needle pierces loose tissues, is conductive anesthesia. The principle involves injection of a nerve trunk, which inhibits the function of that nerve below or peripherally to that point.



Mandibular Anesthesia.

As far as dental practice is concerned, mandibular anesthesia is the most important conductive procedure, because it is most often indicated, owing to the frequent occurrence of caries in the lower

molars. It comprehends a technique which is rather difficult to master, but it compensates for this in the certainty of its effect. The end and aim of the injection is to block the inferior dental nerve by forcing novocain solution in a restricted area immediately surrounding the inferior

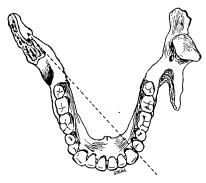


Fig. 12.

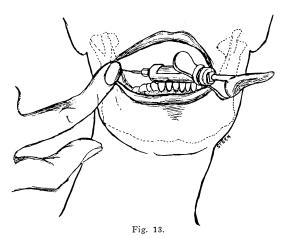
dental foramen, where the nerve in question enters the mandible to supply its peripheraries. The lingual nerve, because of its proximity to the inferior dental nerve at this point also becomes affected. Successful technique should obtain a complete anesthesia of all tissues extending posteriorly to the first lower bicuspid, as well as partial anesthesia of the anterior teeth.

A certain amount of sensation persists here because of the anastamosis of filaments emerging from the mental foramen of the other side of the jaw and penetrating beyond the median line. Complete anesthesia of the anterior teeth as well as the posterior is most satisfactorily produced by injecting into the inferior dental foramen on both sides, depriving the entire lower jaw of sensation. Paralyzing the anastamosing filaments by injection into the mental foramen of the opposite side is possible, but less certain.

A study of the shape of the body of the mandible and the angle of inclination of the rami to it should prove interesting and helpful. Because of the limited scope of this work, however, I will confine myself to a consideration of the points of identification or "landmarks" in the living subject.

Having drawn the cheek away, palpation examination of the mouth will disclose the fact that the anterior border of the ramus slants up-

wards and outwards from the alveolar process of the last molar. A short distance externally, if the finger tip is allowed to slide upwards along this anterior border, it will soon lodge in a slight depression, the retromolar fossa. In some cases this fossa is so shallow as to be almost obliterated, but it is always present, and the practised hand can always detect it. The internal margin of this fossa represents the internal border of the ramus. From this border the inclination of the ramus is decidedly outwards, so that penetration of a needle along the bone is in



a direction which, if produced, would intersect the canine and bicuspid teeth of the opposite side (Fig. 12).

With the foregoing facts in mind, the technique of injection has been designed as follows:

Stand to the right and obliquely in front of the patient. Have the sterile syringe equipped with the long (42 mm.) needle filled and at hand. Spray the mucosa thoroughly with peppermint water. Use the left index finger to palpate for the retromolar fossa and to draw away the cheek in the same movement. Having brought the ball of the fingertip to rest in the fossa, keep it in place with pressure. On no account should the index finger be moved until after the injection is over.

Paint the mucosa liberally with the iodine solution. Heat the needletip, grasp the syringe in the first position, and carefully insert the point of the needle into tissue as close to the center of the index finger-nail as possible, allowing the barrel of the syringe to project in a direction that will intersect the canine tooth of the other side (Fig. 13).

If any obstructions are felt, withdraw the needle somewhat (not entirely) and penetrate again in a slightly different direction. Push the



needle delicately through soft tissue until it is entirely inbedded. At this point, a probing movement should disclose the fact that the needle-point is touching bone. The length of the needle is adjusted to extend just a little beyond the foramen if the direction is correct.

Change to the pistol grip and, while moving the syringe forwards and backwards over a distance of about a centimeter, inject the entire contents of the barrel slowly. Withdraw the needle carefully and wait for the full effect of the injection.

Presently, on being questioned, the patient will admit a swollen or numb feeling in the region Symptoms. This sensation is best of the alveolar border. described as a feeling of "pins and needles," and is identical with the sensation experienced when one's foot or arm "falls asleep." The affected area will gradually spread anteriorly until half of the lower lip becomes partially paralyzed and the chin is devoid of sensation. An impulse to bite the lip is usually experienced. Finally the numbness will extend to the later border and under surface of the tongue, signifying that the lingual nerve has been blocked. With the presentation of these symptoms the operator may, twenty-five minutes after injection, work on any tissue posterior to the cuspid: tooth, bone or mucous membrane, in any manner he sees fit, and he will find the entire area devoid of sensation.

If the anterior teeth are to be included in the anesthesia it is the writer's practice, as remarked previously, to make the mandibular injection at both inferior dental foramina, rather than to rely on the uncertainty incident to the injection into the mental foramen.

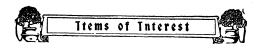
There are four points of injection in the upper jaw. The injection at the maxillary tuberosity together with an injection into the posterior palatine foramen anesthetizes the posterior teeth and tissues; injection into the infra-orbital and anterior palatine foramina disposes of the anterior structures.

Have the apparatus arranged conveniently at

Paterior hand. Spray the mucosa. Draw away the lip and cheek with the index finger of the left hand, while with the thumb, palpate the lower border of the orbit until a depression is found in a line with the upper first bicuspid. This marks the location of the infra-orbital foramen.

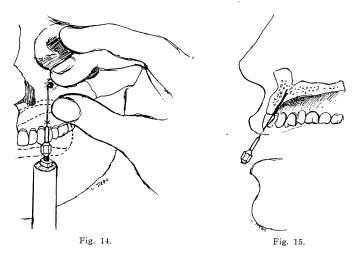
Paint the mucosa with iodine solution and insert the needle into the soft tissues (that is, away from the bone) at a point between the roots of the cuspid and first bicuspid. Advance the needle upwards and in-

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cline it slightly backwards until it is felt beneath the thumb, which should still rest over the foramen (Fig. 14). Inject 1.5 c.c. of novocain solution, withdraw the needle and massage the area of the foramen with the finger-tip.

The anterior palatine foramen should now be injected. Direct the patient to open the mouth, paint the incisive papilla with iodine solution and pierce its center with the sterilized needle (Fig. 15). Deposit a drop of solution immediately beneath the mucosa and hold the syringe in



position for a full minute; the injection is rather painful unless this precaution is observed. Advance the needle slowly in a direction quite parallel to the incisor roots and inject .5 c. c. continuously with its penetration. Withdraw the needle carefully and wait.

Symptoms. The familiar numb sensation is felt almost immediately in the base and side of the nose, later in the lip, which droops noticeably. A waiting period of fully fifteen minutes is advised before work is begun.

Posterior The injection at the maxillary tuberosity is made by fixing the index finger of the left hand on the prominence of the zygomatic process, allowing the thumb to draw away the cheek. The mouth should

be opened but half-way. After painting the area with iodine solution, insert the needle into the well-defined fold of mucous membrane opposite the distal root of the first molar, a distance away from the bone. Allow it to advance upwards and backwards (Fig. 16) holding the barrel of



the syringe outwards, but allowing the needle to slide along the bone. Inject 2 c. c. of solution while moving the syringe inwards and outwards. Withdraw the needle and compress the area of injection with the fingertip.

The posterior palatine foramen is marked by a depression in the palatal mucosa opposite the lingual root of the last molar. Heat the needle, and after sterilizing the mucosa, insert the needle opposite the lingual root of the second molar and at a point 1 cm. distant (palatally)

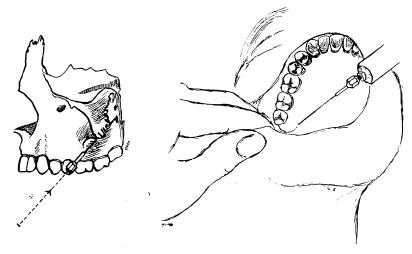


Fig. 16. Fig. 17.

from its apex (Fig. 17). Press upwards, backwards and outwards until the needle has been buried and slowly inject .5 c. c.

Symptoms.

There will be a swollen and numb sensation of the process, and to some extent of the cheek and palate. Operate in fifteen minutes.

Comments on Conductive Anesthesia. Conductive anesthesia, although more difficult in technique is the method to be preferred by the operative dentist.

Infiltration anesthesia seems to involve a slight danger to the pulp, as may be observed in the foled, all injected for the purpose of preparing cavities

lowing cases recorded, all injected for the purpose of preparing cavities where the dentin was highly sensitive. Most of these cavities were superficial.

Method Infiltration	Number of Cases 86	Hyperæmia 9	Death of Pulp
Conductive	. 193	None	None
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To the contrary, among these cases of conductive anesthesia there were numerous instances of relief and cure of pulpitis due to hyperæmia after the novocain had been injected.

It is my practice after preparing a cavity in this manner to dry it thoroughly and place in a pledget of cotton moistened with pure phenol for two or three minutes, wash it out with alcohol and insert the filling immediately. Many of these, including inlays, amalgam, cement and foil fillings were made over six months ago, and presented no trouble to the patient whatsoever with the exceptions mentioned above (using the infiltration method). Unfortunately I have no data as to the condition of those pulps prior to injection.

All in all, in over 400 cases of conductive anesthesia administered for aiding some procedure in operative dentistry, not one case of hyperæmia or death of pulp developed.

As a precautionary measure it is advisable always to administer analysesic drugs locally to counteract any pain (which comes about normally) after the anesthetic wears off.

For this reason the writer recommends: After extirpation of pulp—apply campho-phenique in the root canals and seal with a dressing of cotton moistened in copal varnish. After scaling or after grinding vital abutments—burnish zinc chloride into the dried surface of dentin or cementum. After extraction or surgical procedure—either euroform paste, or in extensive cases, tamponing with pure novocain powder. Also, as described above, after preparing a cavity, allow either phenol or creosote to penetrate the dentinal tubuli to some distance.

Post-Operative Pains.

Post-operative pains are best eliminated by a strict adherence to the technique described. Isotonia of the injecting solution is an important point to emphasize in this relation. Likewise the precautions

mentioned in the paragraphs immediately preceding. Pain at the point of injection is sometimes a little troublesome, but this may be avoided by massaging the site of the puncture with euroform paste (Buckley), immediately following the injection.

Dangers of Local Anesthesia. There is but one danger that presents in local anesthesia with novocain and that is the risk of infection. At the expense of repetition I desire to emphasize again the importance of blocking every

avenue of danger from infection by obtaining and maintaining the most rigid asepsis. Another source of infection is the infiltration of abscessed areas. When in doubt as to whether this course will spread the infection, always resort to conductive anesthesia.



There is little danger of drug poisoning as rather large doses of novocain are borne without harmful effects. Frequently I have had occasion to inject 10—15 c. c. of a two per cent. solution of novocain without the patient experiencing inconvenience. In fact in no case have I observed a toxic effect of novocain.



Fig. 18.

The will be found that the average patient dreads the insertion of the needle because pain is anticipated. Provided the operator is skilled in the technique of injection, there will be little actual pain associated with the insertion; merely a dull, pressing sensation as the needle travels. It is necessary to inspire the patient with confidence in the method and in the operator.

Still, there is a certain amount of psychic shock which presents in nervous patients, and that may be alleviated. A minute or two before the injection is to be made, 6 or 7 minims of validol (Farbwerke, Hoechst

Co.) may be given in a glass of cold water. Where the operation is to be extensive or severe, shock to the central nervous system may be prevented by advising a dose of bromural a half hour before the appointment.

Accidents
Chrough Careless
Manipulation.

Patient aged 38. Referred to Vanderbilt Clinic from private practice.

The case pictured in the radiograph (Fig. 18) is illustrative of the unfortunate sequellæ attending careless manipulation and technique in the practice

of local anesthesia.

Two days before the patient presented himself, a hurried mandibular injection had been given and the needle (42 mm.) became broken at the hub, imbedding itself deeply into the soft tissues.

Examination disclosed a locked-jaw condition, due to inflammation of the pterygoid muscles through the irritation of a foreign body.

An injection of 2 c.c. of novocain relieved the trismus sufficiently to enable an exploratory incision to be made, but it became impossible to locate the needle on account of the patient's refusal of co-operation.

Too much emphasis cannot be placed on the necessity for extreme care in technique in so delicate a procedure as conductive anesthesia.

In closing, let me emphasize that although this article pretends to be a guide in local anesthesia to the practitioner, it can at best only supplement practical demonstrations and experience. Caution must be observed in introducing the method, as the operations involved are of a very delicate nature. The use of conductive anesthesia in the past has produced remarkable results which justify its use as the most positive method for rendering dental operations painless.



An Accident with Conductive Anesthesia.

By A. Berger, D.D.S., New York City.

Now, when there is a widespread and more or less genuine interest evinced by the profession toward "conductive anesthesia," the report of the following case which was referred to me may be rather timely and interesting.



Fig. 1.

Although the books which treat on conductive anesthesia do speak of the possibility of accidents of this kind, yet I do not know of a case having been reported and illustrated in a similar manner by means of a radiograph. My object in reporting this case is merely to caution the members of the profession against one of the unpleasantest possible accidents accompanying conductive anesthesia, and not to deter them from adopting and practicing a method which is unique and excellent.

The accompanying radiograph (Fig. 1) shows a steel needle which was broken and lost in the tissues overlying the inner surface of the ramus of the mandible in an attempt to inject the inferior maxillary nerve.

In the radiograph it appears as though the needle were placed rather superficially, and that its removal could be accomplished with facility. Owing to the numerous structures in this area, the operation is a rather

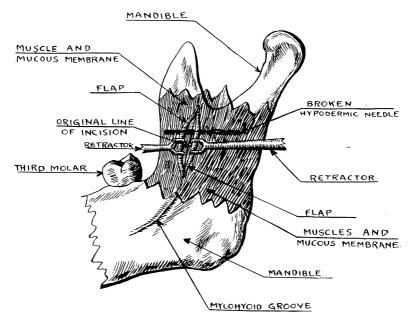
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exacting and delicate one, and was accomplished in the following manner:

The accompanying radiograph shows the broken needle, and the diagram (Fig. 2) illustrates the method employed in its removal.

A vertical incision from above downward about one inch long was made three-eighths of an inch behind the anterior border of the ramus. After the mucous membrane was incised, the facial and some of the



INNER SIDE OF LOWER JAW Fig. 2.

muscle tissues were cut through. With the same direction the depth of the incision was increased until the needle was felt under the blade of the scalpel. The incised tissues were gently pushed aside and the needle firmly grasped and withdrawn with a pair of haemostatic forceps.

There are several vital points in this case which should impress those members of the profession who advocate and practice conductive anesthesia.

Ist—Iridio-platinum needles are preferable to steel ones.

2d—If using steel needles, do not use rusty or defective ones.

3d—Do not try to force the needle through the bone, but overcome the resistance offered, either by displacing the needle by the proper manipulation of the finger or by changing the direction of the needle.



The Relation of the Internal Secretory Organs to Malocclusion, Facial Deformity and Dental Disease.*

By Clarence J. Grieves, D.D.S., Baltimore, Md.
Read before The American Society of Orthodontists, Toronto, Canada, July, 2-3, 1914

In presenting this paper the writer desires first to admit his limitations and to make an explanation, if not an apology, for so much has been claimed which cannot be substantiated on the question of the endocrine or ductless glands and their presumed function, that real physiologists are apt to look askance at the man who mentions their relation to any etiology, and his reputation as a therapeutist is at stake, if he even suggests organo-therapy.

Much of this distrust is well founded in the past experience of those who have been misled by the wildest flights of the so-called, but spurious, "scientific imagination"; real scientific imagery, says a recent review, "(1) whether we call it by that name, or designate it as a tentative hypothesis or a working plan, is the incentive that spurs to the highest scientific effort." Professor D. Fraser Harris (2) of the Dalhousie University has brought together in print some instances in which an idea first represented by a metaphorical expression has in time become clothed into reality; oxygen was merely a principle to Lavoisier in 1777, and when a century later it was produced in liquefied form "the metaphor had become an actuality." In physiologic chemistry, the synthesis of the active principle of the suprarenal glands represents "the crystallization of a notion; the thing of the mind has become the thing of the

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^{*}This paper, to which additions have been made, was read before The Academy of Stomatology, Philadelphia, Pa., May 26, 1914.



laboratory; the thought has been captured and bottled." "Thus it is sometimes given to the man of science," again says Harris, "to touch, to taste, to handle what was once only a notion, a suggestion, a forecast, either in his own day or that of a less fortunate predecessor." "The fabric of medical progress, indeed, of all progress is woven from legitimate dreams to a greater extent than the practical man is wont to realize or willing to admit."

In the light of this pronouncement, in spite of the fact that we have been at times awed and hushed by the statement that the dentist should

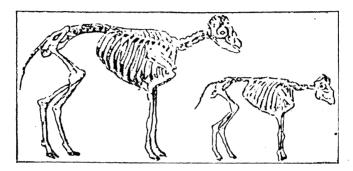


Fig. 1.

better stick to the filling of the teeth, as the shoemaker was one time told to stick to his last; we still believe that any science is our science if it be ever so remotely involved in our work, and an effort will be made to assemble certain of these facts from widely variant sources into a working hypothesis. Not one item is here submitted but what has been proven by at least three investigators, either in the laboratory, the clinic or by organo-therapy; even so, there remain sad gaps in this, as in every new theory, which have to be bridged by probabilities, all of which will be noted; there will be much error, no doubt, but if one little strand of truth can be made to correlate into a real etiology, where hitherto, in these conditions, we have been doubtful it will be beyond the hopes of the writer.

We will attempt to show that at least three of the internal secretory organs are necessary to the maintenance of life and nearly all of them preside, each in its own way over bodily growth, nutrition and metabolism of proteids, sugars, starches, and fats; that they are of particular interest to us in relation to the connective tissue group, from mucoid tissue to bone and dentin, including the epithelial product, enamel; that they control alkaline store houses in the bones, in-



cluding waste and repair of the same, particularly of calcium and sodium salts; that there is an intimate connection between these organs and the sympathetic nervous system in all its nutritive processes. As Starling (3) has explained, this means of tissue communication through a chemical or hormone, discharged into the blood stream, is the primitive method

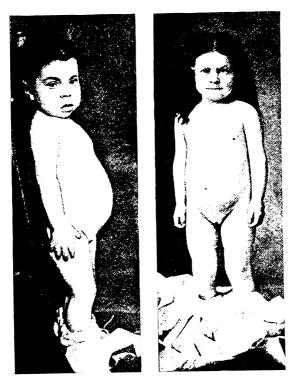


Fig. 2.

before the formation of a nervous system, and it is the only method active now in the lower life forms; but greater specialization called into being, first the sympathetic, and later the central nervous system, for more rapid communication; nevertheless this primitive form of chemical stimuli has been retained in its inter-relation with all the group and in partial control of the great nervous systems.

Second. With or compensate and inhibit each other in cycle, so that any interfering influence or disease which disturbs this co-ordination, seriously and very diversely, affects nutrition, bodily development and function according to the time at which it

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occurs, before or after puberty, with the most marked effect at the periods of bodily stress and change, *i. e.*, from birth to tooth eruption; the first and second dentitions; puberty and menstruation; pregnancy and lactation in the female; the climacteric and senility in both sexes; that the internal secretory organs have each a special function in these important periods besides that of growth, presiding over parturition; controlling sex and sex characteristics; promoting lactation and main-



Fig. 3.

taining immunity to infectious diseases in the infant, and all of this cycle is peculiarly susceptible to damage from the infectious diseases of child-hood, as scarlet fever, measles, chicken-pox, whooping cough, etc.

That normal development of the bones of the face and the base of the skull; the proper growth and articulation of these with the base of the skull; the growth of the nasal and post-nasal regions and accessory sinuses and the eruption of the teeth, all depend upon the correct functioning of these organs in their correlation with the sympathetic nervous system. Insufficiency or disease in any one, will interfere with the synchronism of the whole, causing various forms of deformity; as in the major expression, for instance, thyroid disease producing cretinism and myxedema, and pituitary disease producing acromegaly and giantism, all affecting facial regions; as in the minor expression, glandular insufficiency producing the different forms of malocclusion and defects in the teeth and their eruption. That the "stress of dentition" both temporary and permanent, together with all of its attendant serious reflex neuroses, is



produced by such glandular insufficiency and trophic disturbance, interfering with the necessary synchronism of bone development. That tooth formation and the development of the dental follicle after birth, possibly before; the enamel organ and dentin germ and their fixed products, enamel and dentin, and the other dental tissues, which may be repaired, dental pulp, cementum, peridental membrane and alveolar walls are controlled by this cycle, defective functioning of the same being



Fig. 4.

illustrated in a highly cancellous alveolus and root resorption: enamel hypoplasias and opaque spots; microscopic defects in enamel rods, which often symmetrically occur in all four of a group of teeth, the first molar, for instance (being subject to early caries, which Waller mentions), and interglobular dentin areas, etc., etc. That, at least, a part of the etiology of dental caries may be explained by the function of these glands in sugar metabolism as shown by Kirk (4) and many other obscure conditions of the mouth and saliva (witness the unexplained relation of the testes and pancreas to salivary glands) all associated with the wasting of the tooth surfaces, may be accounted for by defective calcium and sodium metabolism and excessive waste of body salts, and all these are in a way under this glandular control.

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That there is an increasing percentage of malocclusion observed in both dentures, particularly the temporary; the premaxilæ and the maxillæ frequently fail to develop downward and forward normally; and the palatal processes of the maxilla do not develop antero-laterally to the norm, with the result that the first maxillary molars, instead of always being in correct position as claimed, are nearly always in lingual relation, ac-

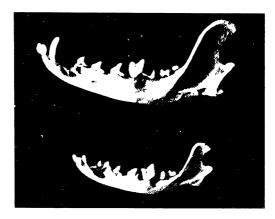


Fig. 5.

cording to Bonwill's rule; and who can say just what normal occlusion is, in the temporary denture, as related to facial angles? That this narrow and too distal eruption of teeth locks the whole occlusion and face in distal relation, particularly if the mandible appear to pass mesially as in Class 3, as noted in the frequent mandibular prognathism of cretins, preventing the downward and forward growth of the accessory sinuses; possibly preventing pneumatization and drainage of these sinuses; that early glandular insufficiency may affect the development of the base of the skull and sella turcica, disturbing pituitary function; that defective premaxillary development often deflects the nasal septum and all of these produce dental impaction and the "stress of dentition."

That hypertrophy of the pharyngeal, and faucial tonsils is common to so many children with normal temporary arches as to constitute primarily not the cause, though after it persists, it may be, of malocclusion and defective facial development, but is coincident with both and is, we believe, produced by the same defective internal secretory influences (34) in their control, or the lack of it, over the thymus and lymphoid tissue (35),



which caused the malocclusion; that the percentage of children suffering from malocclusion, adenoids and hypertrophic faucial tonsils is identical: and that hypertrophied tonsils are not necessarily infected, which is secondary, due to hyperplastic conditions.

That the part played by the gradual evolution in maldevelopment of the face, caused by a lack of use and civilized food habits is recognized, but we hope to show that the most important time for study of defects in facial and post-nasal growth is the period from birth until the eruption of the tem-





Fig. 6a.

Fig. 6b.

porary teeth, where use, save that of function by heredity, could have no effect; that the neglect of breast feeding when correctly augmented later by cow's milk and solids is an important factor; that exclusive bottle feeding deprives the child of certain activators common to healthy mother's milk, which are intended to start the entire internal secretory system to early function, of which growth of bones and teeth is a part, at a time when it is needed most. That the internal secretory organs of bottle-fed babies, on the contrary have to await this process of growth, and that they arrive finally to function, but too late, after mischief is done by delay in this early period. And it can be shown with certain exceptions, such as rachitis, the etiology of which is not clear, that herein lies the cause of the failure to develop, or of development in the wrong direction of the face, teeth and sinuses and the coincident enlargement of pharyngeal tonsils, for the percentage of children with adenoids, enlarged faucial tonsils, and malocclusion are the same as for bottle feeding or defective breast feeding; and bottle feeding has long been clinically associated with these deformities.

Seventh.

That organo-therapy, when intelligently and conservatively exhibited, is said to have done much to correct these facial defects in cretinism and in-



fantile myxedema, without the help of the orthodontist; its use by the co-operation of the specialist of internal medicine, supplemented by calcium and phosphorus feeding is suggested in a selected number of cases for study, while the orthodontist applies mechanical measures. That enough data on the rapid widening of the maxillary arch is in hand, no matter what the method nor what the discussion of effect on the palate, sinuses or sella turcica to prove that there has been rapid nutritional improvement of the child, out of all proportion to the effects we might







Fig. 7a.

Fig. 7b.

expect from sinus pneumatization and drainage; these cases must be studied in connection with all specialists interested, as they suggest stinulation of the pituitary and neighborhood tissues to growth and function. Finally, that while bone development is assisted by modern orthodontic methods and by correct relation and use, it frequently is not maintained, nor are the teeth permanently retained, without proper function of these internal secretory organs presiding over bone growth and calcium metabolism; and, this may explain the failure of good retention and the necessary repetition of orthodontic procedure, which no doubt might be avoided by intelligent supplemental organo-therapy.

That all statements relative to the internal secretory organs are to be accepted with the greatest caution; a "Scotch verdict" is much safer than blind acquiescence, particularly as applied to our work; and so great are the dangers of organo-therapy, that no dentist should attempt it without the internist to watch all body symptoms. On the other hand all observations on mouth conditions reported by physiologists as improved by organo-therapy must first be confirmed by orthodontists and dentists who are more familiar with normal occlusion, for many cases, as Class 2, have returned to what only appeared to be normal by such simple expedients as the adenoid operation, etc., etc. That the part which varia-

tion and heredity play in the formation and eruption of the teeth and development of the face, must never for a moment be forgotten in the study of these conditions. One of the principle objects of this paper is to emphasize the pathological as compared to what might be called normal variation produced by deficient internal secretion (we might add that this is the daily problem of all those who study and treat disease), and to suggest to you Hasting Gilford's (3) theory that insufficiency of this whole internal secretory cycle may also be inherited and run through a family or race leaving its facial imprint.

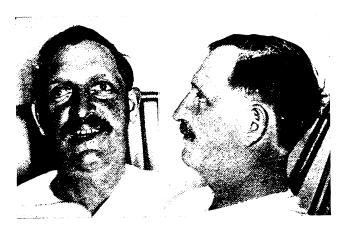


Fig. 8.

The following quotation from a recent paper by Tandler (32) defines the writer's idea exactly. He says: "While fully appreciating the overwhelming results which have been attained in orthodontia within the last few years, we cannot but admit that the theoretical basis for the facts which have been practically confirmed, is yet in many cases deficient. As in many other fields of medical science, therapeutic success has here anticipated the scientific argumentation. Our want of theoretic knowledge relates particularly to two points, viz: (1) To the knowledge of the etiological factors causing malocclusion; (2) To the knowledge of that formal transformation of the skeleton which we are enabled to obtain by therapy.

"As to the first point, we have not yet advanced beyond the realm of vague supposition. Regardless of the fact that only a single reason would be given in supposing mouth-breathing to be an etiological factor in certain types of malocclusion, it should be taken into consideration that mouth-breathing itself again must depend upon certain etiological fac-

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tors. Though we know that mouth-breathing originates by organic changes which obstruct the nasal respiration in some way or other, we need not infer, of course, that these organic changes must be of merely local nature, and do not rather represent partial symptoms of some general constitutional quality. Only exact researches into the constitutional idiosyncrasies of persons with malocclusion can elucidate this question.

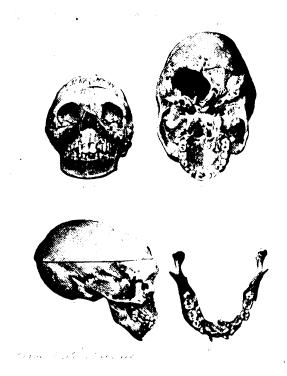


Fig. 9.

"We may mention here the high palate and narrow jaw in degenerated families, where it can hardly be assumed that we have always to deal with mouth-breathers, also the deformities of the jaw in thyrogenic constitutional anomalies, such as are to be found, for example, in endemic cretinism. In these cases we have to deal with people who, although having absolutely flat palates (Fig. 9), prove to be pronounced mouth-breathers.

"However, not only constitutional factors, but likewise congenital diseases, such as hereditary syphilis, are responsible for the shape of the cranium and the jaws. Therefore it is open to doubt whether this



determination of shape is a direct or an indirect one; whether the syphilis acquired in utero itself modifies the jaws, or causes the modification only by producing changes at the base of the cranium, especially at the sutures and synchondroses. The general diseases contracted in early youth, as, for instance, rachitis, should be considered from a similar point of view. The rachitic changes of the cranium and the facial bones without doubt determine the shape of the jaws and consequently the occlusion. How important are the general points of view regarding





Fig. 10.

Fig. 11.

particular organic changes, and including therefore anomalies of the jaws, may be deduced from the vast modifications which the jaws undergo when the normal function of some of the ductless glands is disturbed. We need only to mention here the abnormal function of the pituitary body in acromegaly, which is accompanied by an extraordinary growth of the jaws and separation of the teeth (Figs. 7 and 8). This fact is all the more important since the extirpation of the pituitary body is followed by a diminution of the jaws and consequent recovery from malocclusion. Here, certainly, it would not be correct to speak of mere local conditions.

"Here may also be ranged the changes at the base of the cranium and in the facial bones found in individuals with thyrogenic processes. If the dentition, in its later development, really represents the expression of the normal function of the glands with internal secretion (ductless glands), then, by the disturbance of these functions, changes in the dentition must be caused, accompanied, of course, by disorders in the development of the jaws and by malocclusion."

Recognizing the defects in any attempt at classification for study of the internal secretory organs, they may for our purpose be divided into two groups: the major, because of its vital importance, consisting of the thyroids and para-thyroids, the pituitary body and the thymus; the minor made up of the suprarenals and chromaffin system as associated with the great sympathetic and trophic processes, the sexual glands, testes in the male and corpus luteum of the ovary and mammary glands in the





Fig. 12.

Fig. 13.

female, all of which, except the mammary, whatever their other secretory function, furnish an internal secretion or hormone. Finally, the pharyngeal and faucial tonsils, not secretory organs, but involved in this consideration as a part of the post pharyngeal lymphoid area, closely concerned with phagocytosis and clearly related in the lymphoid cycle to the thymus. These tissues are so often changed normally, in all of the stress periods mentioned, that histologists disagree as to just what the normal really is and the statements proceeding from animal experiment, clinical experience and organo-therapy are equally contradictory. However, an effort will be made to condense these findings, in the time permitted.

Osborne (5) says: "The physiologic activities which the normal thyroid is expected to furnish may be summed up as follows: It is a necessary stimulant

to growth in childhood both bodily and mentally; it takes an active part in the deposition and distribution of fat and in nitrogen metabolism; it is an active opponent of nitrogen poisoning; without its activity proper genital development is impossible and secretions of the genital organs are imperfect. It takes an active part in the function of menstruation



and in development of the fetus in pregnancy; during such periods it furnishes an extra amount of secretion. If it does not do so, the menstrual function is imperfect, the woman during pregnancy is abnormal and parturition is likely to develop eclampsia and the child be born a cretin."

Cretinism is a mark of thyroid insufficiency in the child as is myxedema in the adult; Goiter and Graves disease indicate hypersecretion of the gland;

hence it frequently becomes exhausted and insufficient in these conditions, and the goitrous mother finally produces a cretinous child. All authorities agree that, in the cretin (Fig. 1), early gone growth is delayed, there is premature cessation of development of the base of the skull (Figs. 9, 10, 11, 12), and of the root of the nose, which is broad and flattened (Fig. 2), the lips are coarse, tongue enlarged, skin yellow and leathery and hair is scanty. Biedl (6) emphasizes the fact that puberty is retarded, endochondronal ossification is incomplete, many epiphysis remain unclosed, and Schoneman (10) furnishes ample radiographic proofs of degeneration of the hypophysis cerebri in cretins. "The (3) cretin of twenty-five years of age is stunted (Fig. 3), pot-bellied and ugly, with the intelligence of a child four or five years." Waller (7) emphasizes the fact that there may be many phases of these facial defects leading up to actual cretinism (a partial cretinism without the mental deficiency), due to a small thyroid insufficiency in the child, just as there may be phases of childhood myxedema, and Biedl is especially interesting when he sums up the whole matter thus: "The (6) clinical picture presented by thyroidless children is very suggestive of that of cretinism." We would especially accent the similarity of the facial defects of real cretinism to the worst cases presenting for orthodontic treatment (Figs. 2 and 3), and that these defective arches, particularly maxillary (as in Class 2), malocclusion generally associated with enlarged tongue and mandible and adenoids have all been corrected, according to many authorities, by feeding the child thyroid extract. This is a practice needing immediate and most careful investigation by orthodontists. We would emphasize the statement made by Ott (8) in which all authorities again concur "that a proper amount of thyroid secretion is of especial importance in the early extra-uterine life," one of the periods named in the synopsis, when so many developmental processes are happening to teeth, sinuses and face, many of which, if they go wrong, cannot be repaired, such as enamel defects, hypoplasias, etc. (Fig. 13).

It is equally important that we thoroughly understand the assertion made frequently, that "Suppression (6) of the thyroid is followed by a decreased irritability of the sympathetic nerve and this in turn is manifested in a sluggish circulation and in certain trophic disturbances," be-

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cause trophic processes are those involved, so far as we know in bone and tooth-root absorption and rebuilding; (Fig. 9) tooth eruption and formation, and possibly accessory sinus formation. If these processes are not normally timed, there is "stress of dentition" caused by delay and impaction, frequently resulting in malocclusion, which in turn aggravates these neuroses of faulty dentition. "This (5) gland has some control not yet clearly understood over the central nervous system and the blood and its products," but most important to us as dentists, is its relation to the nutrition of the great connective tissue group (Fig. 4), both in the child and adult, illustrated in myxedema, "which occurs in women to the total of eighty per cent. and may be readily passed on to the child."

Myxedema is the adult expression of hypothy-Muxedema. roidism, producing atrophy of the genitals, ovaries and testes, blunting mental activity, slowing speech and cerebration, reducing proteid metabolism and the amounts of phosphoric acid and carbonic acid excreted, producing hyperplasia of the connective tissues, which Starling and others describe "as a real interstitial growth of these tissues," enlarging the face and tongue, and this may also exist in minor degree during childhood (Figs. 2 and 3) and adolescence and is also claimed to be relieved, by thyroid feeding. It is very suggestive that this hyperplastic condition can occur in children, and it may account for enlargement and protrusive development (Figs. 10 and II), and the failure to contract and turn downward of the premaxillæ, as shown in the study of these bones by Mosher (18), which, after the defect occurs, become ossified into various phases of Class 2. this will indeed explain much hyper-development of these areas.

Hyperthyroidism produces Goiter in endemic and other forms including Graves' disease, and is the Hyperthyroidism. exact obverse of myxedema and cretinism; overfunction often leads to the compensatory enlargement of the gland and frequently thyroid insufficiency in both mother and child. So endemic cretinism in children and animals (Fig. 1), depending apparently on drinking water, is quite common in goitrous districts, one of which "in France in 1873 (6) totalled 120,000 cretins." Biedl's remark, "That thyroid insufficiency does not present cretinous or myxedematous symptoms in the child early or at birth, but that they develop later because the mother's organism sufficiently supplies the fetus with thyroid for the early extra-uterin period," is interesting when read, in the light of the statement, by many physiologists, "That (6) the thyroid presides over lactation, supplying its secretion through mother's milk to the child, and, to prove this, he quotes Spolvarine's studies of myxedema (9) in several sucklings nursed by strumuous or hypothyretic mothers or nurses, "whose



milk," as he says, "did not contain the thyroid substance in sufficient quantity" to activate the child's internal secretory organs.

Che Parathyroid Bodies.

The parathyroid bodies, always existing as two or more, are associated with the thyroid, the loss of all of which produces death, usually by tetany, are particularly active in calcium metabolism. Erdheim

has produced resorption and softening of bone, dentin, and enamel in rats by partial parathyroid removal; it is to be noted that these were rodents with persistent pulps and enamel organs where such resorption is histologically possible by way of the blood stream, and it is to be regretted that there is no record of such experiments on the teeth of mammals, without the persistent pulp. Since this was written the wonderful work of Peter Krantz shows the same results on dogs, pigs and sheep, with changes in size and shape (Figs. 5 and 6) of the dentin and enamel organs, all of which were produced by interference with the endocrine organs and then often corrected by organo-therapy or implanta-(Deutsche Zahnheilkunde in Vortagers, 1914.) A study of the salivary changes would also be most instructive in this connection. "Tetany (8) can ensue in lactation, in rickets and in pregnancy. There is a juvenile tetany and a tetany due to gastro-intestinal diseases." Howland says: "Those who believe that lesions of the parathyroid are the cause of all cases of tetany point to the abnormal teeth often seen with it as a proof of their contention, but tetany seldom occurs without rickets, and it is hard to tell whether it is the tetany or the rickets which affects the teeth." The defects in the teeth, according to the age at which the attack occurs, clinically associated with tetany and rickets, are summed up by Fleishman (9) as follows: "The dentin toward the root of the tooth is quite free from lime; enamel hypoplasias in goblet or basin-shaped cavities or in circumferential rows (Figs. 10, 11 and 13) mark, not only one, but all of a group calcifying at the same period," and he stoutly maintains that these conditions, which were formerly blamed on rickets, are produced by tetany and hence due to the parathyroids. (The writer would call Dr. Ottolengui's papers on root resorption to your attention in this connection and emphasize his discussion of the last one.)

Tetany has been relieved by calcium feeding and parathyroid implantation. MacCallum (11) sums up this very obscure matter by saying: "It is certain that they (the parathyroids) exercise a peculiar, and very important, function in preventing the appearance of an extraordinary change in the circulating fluids, which produces extreme hyper-excitability of the whole nervous system..." "There is much evidence that it produces or even consists in a disturbance in the metabolism of calcium and that the parathyroids control this." One physiologic fact stands out

to the dentist, that in the thyro-parathyroid glands we have two organs, which by internal secretion have to do at the same time with metabolism of calcium and the nervous system, with all of the connective tissues and enamel, which latter they help to form, and, that, when disturbed, they can produce overgrowth or undergrowth of these tissues by the way of the blood stream.

Che Pituitary Body.

The hypophysis or pituitary body, consisting of the pars anterior, pars posterior and pars intermedia, when absolutely extirpated, produced death and functions differently for each part. Out of the mass of

contradictory evidence we quote Cushing as follows: "The pars anterior (12), so far as we can tell, presides more intimately over skeletal growth (Figs. 5 and 6); whereas the posterior lobe has been shown to be more closely allied to the processes of tissue metabolism...an insufficiency in it causing a marked deposition of fat and it is also associated with the activity of the renal and vascular systems." As this gland has to do with growth and sex characteristics, it is in close touch with the sexual glands and is always enlarged by pregnancy, castration, etc., hence lesions affecting it produce symptoms according to the period at which they occur, before or after puberty, or when the skeletal growth is complete. Approximately, it may be said, that hyper-pituitarism, with hyperplasia of the anterior lobe, before puberty and depending on epiphysial ossification produces giantism, while after puberty it produces acromegaly. This is a discussed point, and Cushing says: "Acromegaly (12) cannot precede giantism, but may be grafted on it," therefore it is incorrect to associate acromegaly with childhood (Fig. 7). In giantism, a lesion occurring before puberty, there is excessive growth of the long bones with marked exostoses and persistence of the epiphyses; hypoplastic sexual conditions, impotence in men and cessation of the menstrual period in women. In acromegaly, a lesion occurring after puberty, enlargement (Fig. 7) occurs in bones already complete, including the mandible and occasionally the maxilla (Fig. 8) with spacing between the anterior teeth, which tip outward; enlargements of the hands and feet, nose, larynx, tongue and lips, including the antra and frontal sinuses. Biedl says: "Investigations (6) of the histology of these bones show that these results are due to deposition and resorption of bone substance as in normal growth."...

Cushing makes a classification, dyspituitarism affecting facial regions (Fig. 8). You are referred to his work on this subject (2).

Hypopituitarism, where many symptoms are common to the hypertype, is marked by stunted skeletal growth (Figs. 5 and 6), forms of dwarfism, genital hypoplasia and infantile sex characteristics, with great deposits



of fat; Cushing (12) mentions nasal prominence, due to sphenoidal distortion (Fig. 8) as contrasted to mandibular enlargement in acromegaly; there is a particularly high sugar tolerance and a preference for large amounts of sugar and carbohydrate food; sugar, as such appears in the blood, and it is notable that Cushing (12) and others insist that other endocrine bodies besides the pituitary enter into the sugar question, as the thyroids, parathyroids and adrenals. It is said that both these conditions are the result of struma in or near the pituitary, producing pressure, illustrated by the neighborhood symptoms, as on the optic nerve causing hemianopsia, and the gland may hypo- or hyper-function, finally ending in glandular insufficiency.

The significance of all of the foregoing to the dentist is, that he should differentiate acromegaly from mandibular protrusion from other causes (compare Figs. 7 and 8 with Figs. 10, 11 and 12) and be able to recognize the tilting forward of the anterior teeth and increase in interdental spaces. The orthodontist should bear in mind, no matter what his theory, from the numerous cases showing improvement in the pituitary syndrome, that it may yet be possible to relieve some of these symptoms by spreading the arches, possibly by drainage of the ethmoidal and sphenoidal sinuses, relief of lymph blocking or of the circulation; the forces acting in some way not known; but he should never speak of relieving pressure in the basilo-sphenoid and allowing the pituitary to sink from sellar decompression, by widening the arch, for that is impossible mechanically and anatomically, and he should always bear in mind the fact that "the base of the skull is an entity."

There is not sufficient time to go into this important subject and you are referred to the clinical evidence of Hawley, Barnes, G. V. I. Brown, and Price, and to the numerous papers including that of C. M. Wright, M.D. (33), which we paraphrase briefly as follows:

Dr. Wright shows that "malformations, which interfere with normal performance of physiological function of the accessory sinuses of the nose, together with interference with the lymphatic circulation within the nasal fossæ, are directly responsible for such intercranial conditions." Explaining the relation of the emissary veins, the foramen cæcum and the circulation of this region, he quotes McClellan's Edition (Reference Handbook of Medical Sciences, 1901): "In children there is always a communication between the nasal veins and the superior longitudinal sinus through the foramen cæcum; this is usually closed at puberty, but may continue in the adult." Having proven the venous stasis in these conditions, he shows that the same cause will produce lymphatic stagnation, quoting Cunio and Andri, to the effect "that the peri-meningeal spaces communicate with the lymphatics of the nasal fossæ across the

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cribriform plate of the ethmoid by canals, which are independent of those for the sheath of the olfactory nerve." Tilly is quoted to the effect that "direct communication between the lymphatics of the olfactory region and the basal lymphatics of the dura mater has been demonstrated beyond a doubt," and Wright concludes that "this lymphatic stagnation, then we must admit, plays an important part in the sequella of nasal obstruction, affecting the function of the base of the brain and its contents." In the light of the foregoing orthodontists and surgeons should not be overhasty in their judgment of the validity of the claims in certain well-authenticated cases presented by experienced clinicians, which appear very much to the writer as the relief of lymph blocking and return to function of a circulatory stasis.

The Chymus Body.

The thymus body* increases in size from the embryo up to the second year, after which it functions and gradually involutes at puberty; it occasionally persists when this cycle is defective, particularly after

castration or in early hyposexual states. That it presides over bone growth is shown by the fact that "the (8) femur of a thymected dog only contained one-half as much of the tricalcic salts as the control, and the bones could be cut with scissors"; when the thymus is insufficient, "artifically produced fractures unite only by connective tissues." Ott says: "The alkali depot in the bones acts as an antacid depot. The thymus is, perhaps, in the young animal the chief organ for the synthesis of nuclein: its removal would leave the neuclinic and phosphoric acid to cause an acidosis: these acids dissolve the calcium salts or hold them in solution. Thymus extirpation causes, in animals, rachitis, osteomalacia and osteoporosis." The thymus is a lymph gland and the hyperthymic state, known as the status thymo-lymphaticus, is always fatal to children: there also may be many smaller phases of this generally hyperplastic lymph condition, described by Paltauf. It is therefore of interest to us in this consideration, for hypertrophic states of the pharyngeal and faucial tonsils and all the post pharyngeal region, have been associated with hyperthymic state in minor phase. As many unite in thinking that the thyroid controls the thymus (34), and, that it, together with the spleen, finally takes up the thymus function, an athyroses in the infant would permit of overgrowth of all the post pharyngeal lymph areas, possibly producing adenoids.

^{*}You are referred to the recent work of Halstead (34) who has shown the relation of the supposedly vestigal thymus in adult goitre cases to hyperthyroidism, occurring after thyroidectomy, demonstrating, that the association of these glands is more intimate than was supposed.



Suprarenal Bodies and the Chromaffin System.

Cavarzan (29) claims that deficient function in the adrenals interferes with normal skeletal growth and reports forty-seven cases of osteomalcia cured by epinephrin administration; so no study of this subject is complete which overlooks the extremely important relation of the suprarenal bodies and the chromaffin system to the great sympathetic nervous system, which has so much to do in a trophic way with the development of the head and face. Chromaffin tissue exists alike in the sympathetic ganglia and the medulla of the adrenals. Starling says (3): "A list of the actions of adrenalin, the active principal of the suprarenals, is identical with a list of the chief functions of the sympathetic nervous system," and Biedl agrees that "adrenalin (6) is the hormone by which irritability of the sympathetic is regulated." Some of the functions of the sympathetic are: heart, muscle, and vascular tone and control of blood pressure; it also regulates the amount of sugar in the blood and glandular secretion generally as that of the saliva, for instance. must remember, that it is these trophic processes, more or less blood to the part, which constitute the only acceptable theory given thus far on the obscure question of tooth eruption, the root and alveolar absorption that permits it, and the physiologic repair which rebuilds anew the alveolus. There is also a demonstrated relation of the chromaffin tissue in the adrenals and sympathetic to the same tissue existing in the islands of Langerhans (Cohnheim), in the pancreas, controlling carbohydrate metabolism and involved in the etiology of diabetes; and just as there is some unknown relation of the testes to the salivary glands in mumps, as salivary secretion is controlled by the sympathetic, we cannot but believe that this may have something to do with the carbohydrate content of blood, possibly the saliva in excessive dental caries during the stress periods mentioned in the synopsis.

The Sexual Glands, Cestes in the Male; Ovary and Mammary Glands in the Female.

Castration and eunuchism have long been a proof of the internal secretory action of the cells of Leydig (interstitial cells of the testes), the hormone from which controls bodily growth and the union of the epiphyses. The phenomena of senility fairly represents the further hypoaction of these cells, but it is in the relation of the corpus luteum of the ovary and fetus to lactation, that our greatest interest centers. There is no better illustration of the inter-relation of all this group than in the development of mammary glands and milk secretion, which Starling and Clapon have proven can be produced independently of nervous control.

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Ott (13) and Scott say: "That several glands concur to increase a secretion was well illustrated in that of milk, where we have five: infundibulin, pineal, corpus luteum (3), thymus and mammary." It has already been shown that the thyroid, parathyroids and pituitary are prominent in this cycle, as they are enlarged and finally depleted by continued lactation. Human milk is a composite of the blood content suited to nourishment of the child at different periods of growth, as proven by Starling in the increasing percentage, proportionate to age, of lecithin, a phosphatic fat constructive of the nervous system; immunity or disease of the mother can be transmitted to child by alexins and antibodies or toxins, which have been demonstrated by Welch and Ehrlich (3) in human milk, and it is probable, as all of these glands concur in its secretion, that their hormones exist as such in milk, to the early activation of the whole internal secretory system in the child. This point will be mentioned later. The compensatory and inhibitory action of this whole group is so complicated and little understood as to be merely mentioned; for instance, the thyroid, pituitary and sexual glands are said to co-operate, which seems likely, as all are disturbed by menstruation, pregnancy and lactation. The thymus and adrenals are thought to oppose this group (34); all of which is most confusing, so you are referred to Falta, Eppinger and Biedl. This whole phenomena of growth of the child is recently summed up by Hastings Gilford (14) as follows:

Che Effect of the Ductless Clands upon Development.

"We find by virtue of their secretions, or in some cryptic manner, that they preside over certain correlations of the body. These correlations are by no means rigid, but indeed exceedingly variable, and the variability is most apt to be shown when circumstances are abnormal. The adjusting mechanism of development is not only flexible, but is more or less reciprocal, so that a ductless gland both influences development and is itself changed by general development."

"In this harmony, which is produced by concerted action of the ductless glands, we have reason to suppose that the leading part is played by the thyroid. This supplies a stimulus for the metabolism of the body as a whole. During infancy and childhood, when it it most important that the fires of metabolism should be controlled, the influence of the thyroid is checked by the thymus (34) and by the lymphatic system in general." "This brings about that delay of sexual activity which is so essential to proper maturation and stability of the somatic faculties." "Probably the first to break through the cordon of conservative influences is the adrenal system, which awakens the dormant sexual organs and hastens growth of the skeletal and muscular systems. Development is further stimulated by the pituitary, which awakens every organ

in the body, including sex organs. These latter ripen now apace, and assisted by the combined action of the ductless glands, some awakening and some resisting, carry the development of the body on waves and ties to its flood." From the evidence quoted it is plain that the thyroparathyroid apparatus is the controlling factor, active in child growth opposed or assisted by the poly-glandular syndrome; this has a most important bearing on our hypothesis relative to the excessive lymphoid state and hypertrophic pharyngeal and faucial tonsils as mentioned by Gilford when he says: "The thyroid is checked by the thymus and by the lymphatic system in general," while Gierke (15 "believes that the two glands compensate*" (34), at any rate it is probable that thyroid insufficiency or athyroses in infants, may allow increased thymus function and general overdevelopment of the post pharyngeal lymph area, thus producing anenoids, and it is a striking fact that the enlargement of both tonsils is coincident with delayed development of the face and arch, just as it is associated clinically with malocclusion, the percentage of children suffering from all these conditions being about the same. The statement of Waller (16) and Williams (17) that these enlarged tonsils have been reduced by thyroid feeding is very suggestive and needs thorough clinical study.

Norregaard calls attention to the close anatomic relation of the pharyngeal and faucial tonsils to the thyroid explaining that comparative anatomy shows a direct communication between this lymphoid area and the thyroid in some animals. Weglowski, who found traces of direct communication between these throat areas and the thyroid in thirty per cent. out of one hundred and fifty-three cadævers from the fetus to old age. It is Norregaard's opinion that a large percentage of thyroiditis arises from primary focal areas in the tonsils also illustrating this connection.

There is another very prominent factor causing thyroid insufficiency brought out by Waller (16) and accepted by many, *i.e.*, that nearly all of these glands are disturbed in function, hence rendered deficient in secretion, by early attacks of the infectious disease of childhood, measles, scarlet fever, chicken-pox, etc., particularly the thyroid, and, if as stated, this gland is controlled by the thymus lymphoid cycle, when its inhibition is removed, through damage from measles, for instance, there should be hyperplasia of all tonsillar tissue, which would shortly lead to hyper-

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^{*}So definite is this relation that recently, 1914, Halsted, at the J. H. Hospital has gotten satisfactory results confirmed by histologists by destroying the remnants of the thymus by the use of Roentgen rays after the Basedowic symptoms persisted following successful goitre operations: the idea being that the thymus vestige picked up the function of the missing thyroid.

tropic, tonsils and adenoids, which are open always to infection. As a matter of fact, adenoids are said to be produced by this very group of diseases, and as confirmatory of this statement, "a healthy internal secretory apparatus is considered the greatest safeguard against such diseases." It can now be accepted as proven that this cycle of internal secretory organs absolutely controls the formation of the facial bones, nasal and post nasal, as well as the teeth and their eruption; here too we believe it can be established that the thyroid function is predominant. any defect in which will act through all, seriously delaying development. Thyroid insufficiency and its expression cretinism in children is quite the commonest of all the marks of defective internal secretion, and we again call your attention clinically to the mouth and pharyngeal defects of pronounced cretinism (Figs. 2 and 3), the premaxillary protrusion, and irregularity of the teeth; the closed sinuses (Figs. 9, 10, 11 and 12) and deflected septa; the enlarged tonsils and tongue, and ask that you carefully compare these with the more minor defects we are called upon The enlarged tongue associated by medical observers with these conditions is a striking feature, and the question arises, did the hyperplastic tongue protrude the teeth or the narrowed arches crowd the tongue into the pharynx and produce mouth breathing, according to Cryer's idea? As deficiency in the cretin at first prevents development and the closing of the sutures and epiphysis in long bones, where they finally ossify in shortened relation as in the dwarf, with synostosis of the skull and face bones as Starling states (3), why should it not in the child, suffering from athyrosis in less degree than in the cretin, delay the closing of all the sutures which go to unite the face to the skull? viz.: the palate, sphenoid ethmoid, malar, nasal, frontal, vomer and maxillary, and then close these undeveloped sutures in distal relation, preventing forward and downward development of the maxilla and mandible, locking the whole area in bad occlusion and interfering with full development of all the accessory sinuses and nasal septum?

Cime of Closing of Sutures.

We can consider now with profit the periods given by various anatomists, who do not all agree, for the closing of these sutures. The following description is but a brief outline suited to the time allotted this paper and is not exact. The body of

the sphenoid is developed in two large sections, the post-sphenoid, containing the larger part of the sella turcica and the posterior clinoids; and the pre-sphenoid, containing the lesser wings and anterior clinoids, which unite to form the basilo-sphenoid, directly under the pituitary body, a little after birth, in the first stress period of growth given in the synopsis.

It is easy to conceive how a tendency to hypopituitarism might be induced thus early by delay in development of this area, previously ascribed to thyroid insufficiency by imprisoning the growing gland in undeveloped bone, all of which producing outspoken defects later; this is confirmed by studies of the sella in cretinism already quoted, and Gilford's report (30) of a case of ateliosis (arrested development) where he says: "The pituitary is apparently encroached upon by the projecting clinoid processes." Further, the greater wings, the third free portion of the sphenoid, at this period, do not unite with the basilar portion until the end of the second year, as these wings articulate with the palate bone, which in turn joins with the superior maxilla: they are the strongest sutures of the internal attachment of the face to the base of the skull. says: "They give support to the superior dental arch." It is more than significant that nature leaves this whole area unattached, until all the temporary denture is fully in occlusion, and that ossification is not complete between the basilo-sphenoid and the basilar portion of the occipital bone, until between the eighteenth and twenty-fifth year. palate bone, the wedge which unites this whole area, through the greater wings of the sphenoid to the maxilla is developed early; ossification proceeding from two centers for the perpendicular plate, passes toward the articulating edges, which, due to any deficiency in internal secretion or calcium metabolism mentioned, might be delayed in ossification, just as the epiphysis under like condition, and produce a shortening, placing the whole maxilla in distal relation. The zygomatic portion of the temporal. which articulates with the similar process of the malar, bracing the front of the face, does not unite with the rest of temporal bone until well into the first year after birth. The crysta galli and perpendicular plate of the ethmoid, which assist in the anterior superior facial support, do not begin to ossify until the end of the second year, and the sphenoturbinates, entering into this articulation, are not attached to the sphenoid until the second or third year. The vomer, keying this region to the maxilla, develops from two lamina, inclosing the cartilage, by two centers, which are not entirely completed until puberty. Coming to the maxillary bones, the premaxilla are supposed to unite shortly after birth, but it is interesting to find Mosher (18) contending that they really are not completed until the third or fourth year; prior to that time, he says: "They are mere shells holding the temporary and permanent teeth and do not acquire solidity until the permanent incisors are well on the way to eruption." That the palatal processes of the maxilla rarely develop to full width is shown by the lingual relation of the first molar region, which in orthodontic work, nearly always needs expansion. You will, no doubt, associate all of these periods for the closure of this region, articulating the face to skull with Cryer's remark explaining how weak this union is to

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any force applied from within outward and also the striking resemblance in the times named for suture hardening to tooth eruption, which begins for the temporary teeth about the sixth to eighth month after birth, and is about complete by the second year; particularly the eruption of the first permanent molars which is between the fifth and sixth years. None of the numerous theories explaining the eruption of a tooth are satisfactory, just as are none of the theories for the formation of accessory nasal sinuses. W. B. Davis (19), in explaining sinus development, describes the formation of an embryonal epithelial pouch which lies against the bone producing absorption; this invasion is followed by the entrance of air or pneumatization, and this whole process is strikingly similar to the eruption and advance of a tooth; the bony crypts are resorbed only to be built again in sinus formation, just as a tooth advances. Whatever may be the primary cause, both of these processes come under the supervision of vaso-motor and trophic nerves of the sympathetic, which has been shown through the chromaffin system to be controlled by the endocrine glands or internal secretion, any insufficiency in which, would interfere with the synchronism of all of this growth, which is marvelously timed in the normal. If this be true, such defective secretion might well delay sinus development as well as cause irregular dentition, producing malocclusion and dental impaction, with pressure areas even impaction on certain nerves ending in the "stress of dentition" which Kirk (20) has shown may extend its neuroses and reflex irritation even up to the time of the eruption of the third molars. Josefson (21) presents, in a recent report, a mass of radiographs and clinical evidence to show that tardy dentition is a warning that development of the body is not progressing as it should and claims there is some disturbance of the whole ductless gland He recommends systematic organo-therapy (Figs. 2 and 3) during pregnancy in families with a tendency to abnormal dentition and growth of hair, and many medical observers insist that there is early resorption of roots and loss of temporary teeth in rickets and tetany, and auite the reverse in tuberculosis.

Feeding Infants. When we consider the embryology of this whole question; the evident analogy of epithelial enamel and hair; the development of the maxillary arch, for instance, and the greatly divergent anlages from

which the premaxillary portion has to descend and the palatal processes ascend; when statements such as Josefson's are daily occurring in medical literature, it behooves the dentist to prove, or as often disprove, every word of them. We believe one of the principle causes for internal glandular insufficiency to be the present method of artificial feeding of infants and that correct baby feeding is one of the keys by which we will unlock

this problem. Cow's milk which may be modified to the correct percentage of protein, salts, and carbohydrate to suit the growing age of the child, is lacking in certain vital and yet unknown factors contributing to bone growth and preventing such conditions as tetany, rickets, etc. has already been shown that immunity, as also disease, may be conveyed from the mother to the child by breast feeding, and that many internal secretory organs preside over lactation, particularly the thyroid; Bramwell and many others having increased the milk of wet nurses by thyroid feeding, and "it (22) is quite probable that some internal secretion, necessary for perfect nutrition, which is secreted in mother's milk, may be absent in cow's milk, hence bottle fed children may not receive it." Meigs and Harsh (23) report "that human milk differs in three ways from cow's milk, i. e., first, considerably more lactose; second, much less protein, and third, more substances which are important constituents of diet and are soluble in alcohol and ether, but contain no nitrogen, and whose chemical nature is unknown; in the middle period, human milk contains five per cent. of this substance, while cow's milk contains but three per cent." Starling and Clapon insist that these substances vary with different species, Starling saying: "It (3) is impossible, therefore, satisfactorily, to replace the natural milk of an animal by that of another species"; beside these activators of the internal glandular system, there are just as important elements such as various salts and particularly the lecithin content. Lecithin is most important in building the central nervous system and Starling proves, that we have a progressive adaptation of milk to growth, according to the lecithin content in each species: "(3) the calf's brain is only 1-370 of the whole animal with lecithin to protein 1.4 per cent., while the infant's brain forms 1-7 the body weight, with lecithin to protein 3.05 per cent.;" hence the infant would require three times as much lecithin as the calf, otherwise serious nervous disturbance might occur. It would then be quite impossible to start into early function the whole internal secretory system and nourish the infant's developing nervous system with manufactured baby foods; this cycle would be activated earlier with cow's milk. containing three per cent. of such substances, and 1.4 per cent. lecithin, but still there would be that delay which we consider the real cause of all these dental ills, even with modified cow's milk; while with breast milk from a healthy mother, all of this syndrome of growth quoted from Gilford, would be started at once, in the early extra-uterine period, preventing, we believe, defective forward suture development, "the stress of dentition," enamel hypoplasias (Fig. 10, 11 and 13), and such symmetrical enamel defects as lay the tooth open to caries, etc. W. A. Price (24) associates a number of cases of enamel hypoplasia with the use of artificial baby foods, and in a strong résumé, severely censures the users of

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such foods. In discussing this report Dr. E. C. Kirk (24) said: "It has been pretty definitely shown by a number of observers that the secretions of certain of the ductless glands, particularly the parathyroid, has something very definite to do with the process of calcification; that, where the parathyroid is destroyed or diseased, we may feed phosphatic food, and it is not assimilated and the quantity of phosphatic food that is taken to the stomach under these circumstances is rapidly eliminated in equal amount. It is also pretty clear, in the milk of the nursing mother, certain of these important stimulative properties of the ductless glands pass, and, though the child may receive phosphatic nutriment materials in some other form, it is the lack of this stimulus which prevents the child from assimilating the phosphatic elements of artificial foods." Many agree with Starling (3) when he says: "There is no doubt that, of the children dying during the first year of life, four-fifths are murdered by unnatural methods of feeding." W. H. Davis (25) states the fact that "the bottle fed baby is six times as likely to die as the breast fed," and while, no doubt, a good part of this percentage is due to intestinal diseases, there is another element in the generally accepted fact "that the bottle fed baby is much more susceptible to communicable diseases than the breast fed baby." We wish to accent again that Erhlich and Welch have proven the antitoxins which pass over from the mother to the child in human milk "will (3) provide it with a certain measure of passive immunity against possible infection by disease to which its species is liable." Now all of this is most important, for it has been already established that the organs of internal secretion in childhood are peculiarily liable to damage, hence insufficiency from just such early attacks, as measles, chicken-pox, etc. In the bottle fed baby this immunity is not maintained and causes glandular insufficiency, which from any cause will produce dental lesions and enamel hypoplasis, all of which have for years been associated by the dentist with such infectious diseases; it also explains the writer's series of such collected from children of tuberculous parents. other hand, quite as much harm has been done by too prolonged breast, without supplemental feeding or the insistence on feeding the child by the mother with defective milk; rickets and spinal deformities are quite common from this cause, all of which is made clear in recent statements as follows:

"It (22) is also quite probable that some children, even if breast fed, suffer from calcium malnutrition because of defective secreting glands (internal) in the mother; also one or more of the glands of internal secretion in such defective children may be acting insufficiently." The writer does not care to be classed with the breast feeding "faddists," but suggests that in the study of oral defects, all of these diverse conditions



be reviewed and carefully tabulated; a sensible attitude is that of H. M. McClanahan (26) whose conclusion is, "unless the mother is suffering from serious illness, she should nurse her infant (for these valuable activators*), supplementing such nursing by other feeding," and such is the practice in several large institutions where the milk of a few wet nurses is apportioned amongst all the children. Finally, the following statement from A. Hrdlicka, who has studied this whole question of the nasal passages, adenoids and tonsils, dental arches and teeth, in primitive people, from the standpoint of comparative anthropology, is convincing. Dr. Hrdlicka reports a study of over nine hundred and sixty Apache and Pima children, and from his broad experience he states, in all the children examined that:

"There was no abnormal narrowing of the maxillary arch nor protrusion of incisors and no irregularities, except sporadically a little crowding of the
incisors, and that the arches are broader in the second temporary molar
region than in the whites of same type of skull, with the bones generally
heavier"

**That in all his personal experience, he never saw a case of adenoids nor knew of a tonsilitis in an Indian child, although he made careful observations of the breathing of these children both awake and while asleep."

"The Indians have had, and still have, the habit of keeping up the nursing of the child until the second or third year or even later, and the important fact was developed that the Indian mother gave her child various things to chew very early, while she still continued feeding late; here we have the double value of use of a natural sterile and easily digested food, supplemented early by more or less solid foods."

"When asked if open air sleeping did not prevent adenoid vegetations among the Indians, he quoted many facts to show that often the Indian (the Pima, for instance,) slept under the worst possible ventilation; the mud hut is completely closed by blankets against air, and many sleep in one room."

"He accentuated again his idea that evolution was going on in the human skull, face bones, base of skull and teeth, and that it is largely due, so far as the jaws, teeth and facial bones are concerned, to lack of use of the organs of mastication; this tendency to degeneracy due to disuse, and the

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^{*}Author's italics.

still advancing evolution must be recognized as an important factor in all of our considerations."

You are referred to Dr. Hrdlicka's numerous papers (27) on this subject, and we would accent his statement, as to normal width of the temporary and permanent arches in Indian skulls, showing correct bony development of the palatal processes in the region of the first permanent molars, associated with absence of adenoids produced we believe by correct baby feeding and particularly early use.

The metabolism of calcium and other salts, is so intricately involved in this question of breast feeding, Calcium Metabolism. the internal secretions and bone and tooth growth, that no consideration of the subject would be complete without mentioning it. You have heard how the parathyroids preside in some unknown way over calcic waste, which, if not relieved, in the youth if not in the adult, will so profoundly affect the nervous system as to produce convulsions and death, and that calcium feeding will often relieve such states, as it will post-operative tetany. As confirmatory of what has been said we quote a recent article, as follows: "Many (22) of the glands which have an internal secretion, the thyroid and para-thyroid, ovaries and testicles, pituitary and the thymus, in infancy and childhood seem to take a part in normal bone metabolism." "The calcium in the blood has been found to be highest in the child; it decreases slowly with age, being higher in breast fed than in artificially fed children, who seem to retain calcium longer and to store it; it is also more in evidence in breast fed infants, than in those who receive cow's milk....; coagulation of the blood will not occur except when the salts of calcium are present." Ott says (8): "Bones (and we might add teeth*) are chiefly composed of ninety per cent. calcic phosphate and carbonate (this refers to the inorganic percentage*); these are the alkali stores in bone; when the quantity of alkali decreases, these insoluble calcium salts become soluble. In the period of growth of the young there is a great breaking up of nuclear substance, forming neucleinic or phosphoric acid, which may circulate in the blood dissolving the calcium salts and causing an acidosis." "We (22) are more and more coming to understand that condition of the body which may be termed hyperacidity, or, at least, a lessened alkalinity especially of the blood-imperfect excretion of acids or acid salts by the kidneys or bowels will sooner or later cause some serious functional disturbance, some degree of denutrition or serious disturbance of the nervous system, and infant marasmus and gastro-intestinal conditions are due to diminution of alkalies."

^{*}Author's italics.

Of all the phases of disturbed metabolism, calcium waste should hold the interest of the dentist; among, the few coming under our notice may be named, the early resorption of the roots of the temporary teeth and their too early loss, and for the same reason, delayed eruption of the permanent teeth (Fig. 10). Also Waller's idea of the ratio of salts excreted by the salivary glands and appearing in the saliva in relation to dental caries; excessive amounts of certain forms of salivary and serumal calculus and that opposite type, the erosion mouth, one of the expressions of the hyperacid diathesis, where no deposits occur in the teeth, but the acid sodium and calcium salts produce cervical tooth destruction and have been proven in the saliva. Erosion has in more than one instance been associated with deficiency of the thyro-para-thyroid apparatus in middle life and after, by the writer who is also convinced that there are many varieties of wasting and decalcification of tooth structure which are primarily not the work of micro-organisms, though later caries may lodge and grow thereon as it would on mechanical defects. It must be remembered that the periods of stress, first and second dentition, puberty, pregnancy, the climacteric and senility mentioned in the beginning of the paper, when internal secretion as apt to be disturbed, are also the periods when caries is at its worst, and these also are the periods of defective There are also well-authenticated cases of dentinal calcium metabolism. resorption via the pulp, one of which was reported by the writer (28) which this idea of defective calcic metabolism alone will explain as it does the internal dentinal defects of pregnancy, senility and possibly tuberculosis.

In conclusion, it may be said that the dentist of the present and the future can no longer afford to conjure with such expressions as "auto-intoxication," which sound much and mean little; he must think straight on the newer lines of a pathology, based on a new physiology, which recognizes the internal secretory organs, and while all disease does not arise from defective internal secretion, it has its place in any pathology, and the great problem is to properly locate it.

Description of Illustrations.

Fig. 1. Arrest of development in a sheep after a thyroidectomy done six days after birth; the larger one is the skeleton of a normal sheep of the same age. (Von Eiselsberg.)

Fig. 2. Thyroid extract in cretinism. (J. B. McGee.) (a) Cretinic idiot seven years old when thyroid treatment was begun. Had ceased to develop when three years old. The typical protrusion, thick lips and enlarged tongue, if it could be seen, the "pot belly" and hands and coarse scanty hair.

- (b) Changes after one year's treatment. Growth, $8\frac{1}{2}$ inches. The change in the angles of the face and in expression about the mouth, the limbs, abdomen and general development particularly of hair.
- Fig. 3. (a) A cretin, twenty-three months old. (b) The same child, thirty-four months old, after administration of sheep's thyroids for eleven months. (c) A cretin, untreated, fifteen years old. (W. Osler.) Note the typic mouth expression in it and compare with cases presenting for orthodontic treatment. In (b) the result of organo-therapy without the help of the orthodontist, finally the profile, enlarged lips and tongue, scanty hair and swayed back, and general mongolian expression in the fifteen-years-old cretin in (c). From Human Physiology, Starling.
- Fig. 4. Cretinic obesity. Case of cretinism, aged twenty-one. Effect of four months' thyroid treatment. (Sanderson.) From Sajous, Internal Secretion and Principles of Medicine, Vol. I.
- Fig. 5. Peter Krantz. From Deutsche Zahnheilkunde, 1914. (a) Mandible of normal dog. (b) Mandible of a dog after losing its hypophysis.
- Fig. 6. Peter Krantz. From *Deutsche Zahnheilkunde*, 1914. (a) Microphotograph of a section of a normal dog's tooth (the control from the litter), showing size of pulp chamber and tooth and type of dentin.
- (b) Microphotograph—under the same conditions—of a section of a tooth of a dog (same litter) from which the pituitary (hypophysis) had been removed.

Note the reduction in size of the diameter of tooth and the great increase in the pulp chamber, showing a control of the pulp function and dentin formation.

- Fig. 7. A. Note photophobia; spacing of teeth; full ædematous hand; and characteristic acromegalic profile.
- B. Patient at twenty-five, before onset of the malady, constrasted with present condition.

From Cushing: "The Pituitary Body and Its Disorders." "Hyperpituitarism of eight years' duration with outspoken acromegaly."

Fig. 8. Note (left) spacing of teeth; strabismus; adiposity; (right) profile with maxillary rather than mandibular prognathism.

From Cushing: "The Pituitary Body and Its Disorders." An Extensive hypophysial struma with dyspituitarism evidences of former activity shown by slight acromegalic changes.

Note: Cushing repeatedly calls attention to maxillary as well as mandibular protrusion with spacing of the anterior teeth in both jaws caused by pituitary disease.

Fig. 9. Barbara Poehl, born April 6, 1856, in Martinsheim, died Jan. 23, 1887, thirty-one years of age. Could neither walk, stand nor eat

without aid, and her body looked as though it belonged to a two-year-old child, whereas the head was the size usually found in grown-up persons. The superior maxilla seems fairly normal, with the exception of some slight malpositions of some of the teeth, whereas the mandible or inferior maxilla shows nineteen teeth, the entire right side and the incisors upon the left side being double.

Peter Krantz. From a reprint from the Deutsche Monatsschrift fur Zahnheilkunde, 1912.

Your attention is called to the results of defective calcium metabolism shown in the retention of the first dentition (Abb. 19a), the prognathism (Abb. 19c), the width of the arch in the molar region (Abb. 19b), yet the crowding of the incisors in the premaxilla (Abb. 19b).

Fig. 10. Anna Volk, thirty-year-old cretin, died in the Maternity Hospital at Grazer, from eclampsia, on the 6th day of December, 1877. Cretinous skeleton No. 3235; shape of the head oval, superior maxilla asymmetrical, the alveolar process upon the left side reaching more deeply. Occlusion fairly well preserved. Open bite. The teeth are separated to the extent of from two to three millimeters each. Upper incisors are ridged or grooved. Peter Krantz. From a reprint from the Deutsche Monatsschrift fur Zahnheilkunde, 1912.

Note the protrusion and spacing of the incisor groups associated with enamel hypoplasia labial central incisors.

Fig. 11. Katharina Temmel, seventeen years old, single, a cretin. Born in Grafendorf near Steinz. Died Dec. 22, 1881, in the General Hospital at Graz. Skull No. 3663.

Peter Krantz. From a reprint from the Deutsche Monatsschrift fur Zahnheilkunde, 1912.

Note the premaxillary protrusion and compare it with adult malocclusion said to be from other causes. Enamel hypoplasia well marked on all teeth.

Fig. 12. Ferdinand Stock, from Hirschfeld, died July 1, 1902, at the age of twenty-five years. He was a typical cretin. At the autopsy, no thyroid was found. The skeleton was one hundred and four centimeters long. Skull was medium size. Only a few teeth were preserved and they presented typical rachitic grooving, etc. Cuspids mark prognathism.

Peter Krantz. From a reprint from the Deutsche Monatsschrift fur Zahnheilkunde, 1912.

Fig. 13. Female cretin, name unknown and age unknown. Died the year of 1870, General Hospital at Graz, of gangrenous endometritis. Skull No. 1631. Round skull with evident prominence of the distal part of the face. Lower part of the face slightly prominent. Superior maxilla

extends over inferior. Teeth preserved. The upper incisors show distinct undulating grooves.

Peter Krantz. From a reprint from the Deutsche Monatsschrift fur Zahnheilkunde, 1912. Note the well-defined enamel hypoplasia, incisor and canine groups.

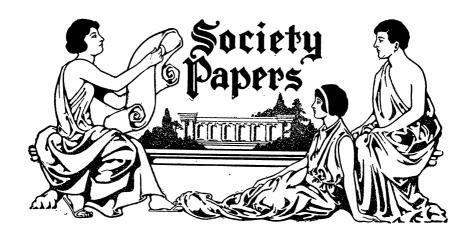
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Che President's Address.

By Dr. George Y. Wilson, Colorado Springs, Colorado.

Read before the Colorado State Dental Association at the annual meeting in
Manitou, June 25, 1914.

Mr. Vice-President, Members and Guests of the Colorado State Dental Association:

It is our good fortune to be assembled for the third consecutive time in this charming little city. Manitou has long been noted for her healthgiving waters, her pure air and grand scenery.

Snow-capped Pike's Peak looms above her. The historic Ute Pass begins its wandering course within her borders, and the far-famed Garden of the Gods brings its malformed rocks as an additional attraction.

In the midst of all this grandeur we have come together for our twenty-eighth annual meeting.

At our meeting a year ago you conferred upon me a very great honor. And while I highly appreciate this honor, I have found (like my namesake in the White House) that this business of being President carries with it vast responsibilities. But I have been fortunate in having associated with me officers and committees who have done much to relieve me and have borne many of these responsibilities.

I desire at this time to thank the officers and members of committees, and all the individual members of the association who have helped so nobly to make this meeting a success. I especially want to express my very great appreciation of the efficient manner in which our Secretary has discharged his unusually strenuous duties. I am sure we all look forward with pleasure to these annual home-comings. It affords us an opportunity to meet neighbors on common grounds, to grasp each other



by the hand, look into one another's faces and compare investigations and experiences.

Here rivalries, jealousies and controversies can be softened and professional friendships can be formed and cemented; and here you can find opportunities for pleasant social intercourse with worthy men.

Association naturally stimulates ambition, develops intellect, and makes one brighter and more companionable, which in turn gives greater power for growth.

Distances in Colorado and Wyoming are great, and the men located in some of the smaller isolated towns are deprived of the advantages of coming in contact with men who have a common interest in the betterment of our profession. The men in the smaller towns need the annual State meeting and the annual State meeting needs these men. In this connection I would suggest and recommend that the officers of this Association send out at stated periods during the year to the members of the Association a report of the proceedings of the last meeting, and any other items which might be of interest. These could be sent out in the form of a bulletin, and would, I believe, keep the members (especially those in isolated towns) in touch with and help them to maintain an interest in our Association.

Some one has said that "Dentistry is no longer regarded as the little sister of medicine, but is a great and mighty science in itself." We often speak of the wonderful advancement the medical profession has made. We are daily hearing of great medical problems that are being better understood and solved, and how is this accomplished? Probably not by the busy practitioner, nor by medical societies, but by research in their great laboratories, such as the Rockefeller and Carnegie Institutes, by men who give their whole life to the work. We have problems as serious as the medical profession, problems that we have not yet solved, and they are as important to mankind as those of the medical profession.

Scientific Research. The Scientific Foundation and Research Commission of our National Dental Association is securing pledges for a fund to be used to secure expert technicians who will give all their time to the work-

ing out of such problems as "Special infection of the mouth and their relation to certain systemic diseases," "Studies of the saliva in its relation to caries," "Metallurgical researches for substitutes for platinum," etc. We are fortunate in having such places as the Forsyth Infirmary in Boston, the Evans Institute in Philadelphia, and the Dental and Medical Departments of the University of Minnesota, to which we may carry our troubles and problems. But we need money to support the technicians in these and other institutions. On the basis of securing \$40,000 a year,

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each year for five years, from the entire dental profession of the United States, Colorado's proportion will be \$500 per year, or \$2,500 in five years. Will we, the members of this Association, shoulder this small responsibility? I feel sure that we will, and more. "There is probably no investment that the dental profession can make that would be so adequate for both the securing of its recognition in the minds of the medical profession and public and for placing its own science and art on a foundation of truth."

Legislative Committee. We have one new committee this year—the Legislative Committee. It requires considerable time for such a committee to accomplish much; but I feel sure they will be ready to act when the op-

portunity presents, and we shall expect them to see to it that Colorado has as good, if not better, dental laws than any other State in the Union.

There should be incorporated in every dental law a reciprocity clause. An applicant should have a license to practice dentistry is granted by the Board

of Dental Examiners located in the State wherein he has lived for five years, at the time of making such application, obtained after passing an examination before the aforesaid board, requiring an equal standard of preliminary education. In addition to possessing a license from the State in which he has practiced and lived for five years, I would require that the candidate bring with him also a certificate signed by the President and Secretary of the Examining Board and by the officers of a Credentials Committee appointed by the State Dental Association. Possessing the above license and certificate and a diploma from a recognized school, the candidate should be given a license by the Examining Board in the State in which he wishes to practice without any examination whatever.

I am a firm believer in making the preliminary requirements both for matriculation and graduation fully up to the standard required by the National Association of Dental Examiners, and I feel that if the candidate is given a diploma from a recognized school of dentistry and succeeds in passing a Board of Dental Examiners and practices dentistry for five years in one State, that if he is good enough to practice his profession in one State, he is good enough to practice on those same patients (and as many more new ones as he can get) in any State in the Union, and I might add in any country on the globe, without any further examination.

If a man is capable of filling a tooth for Mr. Jones while Jocated in Colorado, there is no earthly reason why he cannot take Mr. Jones across into Kansas and fill another tooth for him there, provided, of



course, that he has in his pocket credentials signed by the proper authorities in Colorado, for which the Examining Board in Kansas gives him a license to fill any and all of Mr. Jones' teeth if desired. The Kansas Board would be very glad to be relieved of the responsibility of examining the candidate, for they would realize that the Colorado Board and Credentials Committee know far more about the candidate than they could possibly learn during an examination. Besides, the Kansas Board would realize that the candidate had gone through one gruelling examination before the Colorado Board, which should exempt him from examinations in dentistry the rest of his natural life, no matter in what portion of the United States he may wish to locate.

Story of a Minnesota Examination.

We read that "Reciprocity is meting out dental justice to all States, nations and individuals." If a candidate wishes to be enlightened as to the so-called "justice of reciprocity" now existing between some of our States, let him decide

to locate in Minnesota after having practiced for five years in Wisconsin, and the reciprocity and the injustice thereof will have a new meaning for him. He is exempt from the theory portion of the examination. Instead of being tortured for five days, he is let off with a four-day siege. He pays into the Minnesota treasury \$50, as against \$25, for the privilege of coming under the reciprocity ruling. He must present the Minnesota Board with testimonials from two reputable dentists and from two other citizens from the State of Wisconsin, besides, of course, showing the Minnesota Board his diploma and his Wisconsin license. Then he is ready to proceed with his examination, in which he must pass an 85 per cent. mark instead of 75 per cent., as would be the case if he were not in the favored reciprocity class. This Wisconsin dentist, who is probably as capable a dentist as any man on the Minnesota Board, is now assigned a patient and the various operations required are punched on an examination blank. The patient proves to be a hard subject, which, of course, does not add anything to the dentist's peace of mind. Working in a large, crowded room, away from the chair and equipments with which he is familiar, deprived of the service of a trained assistant, and naturally anxious about the results of the ordeal, he finds himself working under a severe strain, and operations which would be comparatively easy for him in his own office loom up as great impossibilities in his present situation and surroundings. But he makes a start and prepares a cavity for an amalgam filling, and with great difficulty adjusts the rubber dam, as the decay has extended far up under the gum. The board requires that the rubber be in position when they are asked to examine the cavity. Each member of the class of seventy-five

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applicants is calling for the examiners, and by the time our Wisconsin friend succeeds in getting each of the six members of the board to inspect and pass on the prepared cavity, and has felt the cold, unsympathetic attitude of most of them, and listened to some rather uncomplimentary remarks, he is not in a very calm mood. The completed amalgam filling is passed on in the same manner, and the same procedure is repeated at certain steps in the different operations which follow. The laboratory is at a considerable distance from the operating room, and its equipment in the way of casting machines, etc., are new to him. Methods of constructing some of the work is different from anything he has ever done. For instance, he is expected to make a double-band cast crown, something he has never attempted in all his years of practice. The result is that work which he could have completed in a day in his own office he has difficulty in completing in four during the examination.

I am well acquainted with a dentist who recently went through an examination given by that same board; he is a man who has always ranked well among his fellow practitioners. He was president of his class in his junior year in dental school. He has been president of his local and State societies and has always enjoyed a large practice. He says that this examination unnerved him to such an extent that he could neither eat nor sleep, and he lost ten pounds during the siege. The first day was the hardest day of his life up to that time. The second day was much worse. The third day he could hardly drag himself to the horrible task, and the very thought of asking some of those stony hearted examiners to pass on his work required all the courage he could command. The morning of the fourth day found him almost a wreck, but he succeeded in completing the operations required by the board and went home to await their verdict. After a few days' suspense, he received a little printed form, which read:

"Dear Doctor: On behalf of the Board of Dental Examiners of the State of Minnesota, I regret to inform you that you failed to receive the required percentage at the examination held recently. Very respectfully yours, Secretary."

This whole procedure is neither justice nor is it reciprocity. I call it selfishness, and the very opposite of the Golden Rule. There are, no doubt, dentists who would like to locate in Colorado, and if it is a matter of health for themselves or some member of their family, it should be a fraternal privilege for us who have our practice so established to give them an opportunity to earn bread and butter for themselves and those dependent on them. This task for them at first will be very difficult at best, and it is inhuman to add additional burdens in the way of unjust examinations. While it is true that dentists might wish to locate in



Colorado, coming as they would from other States, perhaps other countries, it is also true that many men in Colorado, because of the altitude or other reasons would like to move other States. Is it not enough that they give up a good practice and friends and begin all over in a new and strange State, without having to go through the miseries of an examination?

In our choice of an Examining Board in this State we have men who have shown themselves very capable, broad-minded administrators of justice, and I feel that if our Legislative Committee could succeed in getting a reciprocity bill passed it would place our State far in advance of many of the States which, under the guise of protection to the public, are by unjust examinations trying to keep dentists out of their States.

Our example would be followed in time by other States, and the time need not be far distant when a man with proper credentials may feel that he can practice his profession outside the confines of the State in which he happens to be located. All the world comes to Colorado and has dentistry done while here. And in my mind there is no good reason why dentists who have complied with the requirements of Colorado dental laws, and who have had the proper professional education, may not go out into any other State or any country in the world and practice his profession.

I would recommend that in the near future the President of this Association appoint a Credentials Committee, whose duty would be to co-operate with the Board of Dental Examiners and with the Membership Committee, so that when the proper time comes they will be ready to act.

There are many other subjects of which I perhaps should make some mention, but I feel that this address is already too long.

I have one request to make, and that is that all of you try to be present at the exact time and hour of our sessions. In this way only can sufficient time be devoted to the reading of papers and for complete discussion of same.

Reeping Our Patients Comfortable During Mastication.

By Dr. O. L. Whitson, Pueblo, Colorado.

Read before the Colorado State Dental Association at the annual meeting in Manitou, June 26, 1914.

I am intruding the reconsideration of a very old subject on you at this time because of the fact that so many men in the profession are continuing to ignore it, even after all that has been said and written upon it. This seems amazing to most of us, because of all the factors involved in the filling of cavities in the approximal surfaces of the teeth this one of proper contact is the most important, with one or two exceptions. Our chief consideration necessarily is to stop the decay, but aside from this the maintenance of proper contact becomes paramount. Without this there is little comfort to the patient and no assurance that the tooth operated on will be saved.

Evil Results
of Each of
Approximal Contact.

Inadequate and poor contact leads inevitably to the lodgment of fibrous food between the teeth in the interproximal spaces, and this just as inevitably leads to destruction of the gum tissue occupying that space. If it stopped at this it would be serious

enough, but unfortunately it goes further and does greater damage. It has frequently been pointed out that disastrous results follow the impaction of food between teeth, causing injury to the tissues, both soft and hard, and finally resulting in loss of the teeth. It probably never enters the mind of the average operator, even among those who have been impressed with the importance of maintaining the normal contact between teeth, that there is grave danger of losing a tooth as the direct result of bad contact, but the more the matter is studied the more certain it becomes that the loss of very many teeth may be traced directly to this cause.

The reason why this fact is not more universally recognized is because so much time usually elapses between the insertion of the filling and the ultimate loss of the tooth. On account of this, the filling is not suspected, and the responsibility is placed on some more or less obscure cause, which results in recession of the gum tissue and loosening of the tooth. There are, of course, various causes for gum recession, but it is safe to say that in these cases where such disastrous pockets are formed between teeth, the initial lesion was started by the impaction of food due to faulty contact.

The question is, why cannot we of the profession be more observant when these cases present and detect the original trouble in time to remedy



it and save the tooth? Or, better, why cannot we understand the theory of good contact sufficiently to give fillings the correct form?

Diagnosis of Poor Contact.

Leaky contacts are usually manifest at a very early stage on examining any mouth. If fibres of food are found lodged between the approximal surfaces, something is wrong, and it should be at once

remedied. Not intrequently our patients tolerate these annoyances because they do not quite know what the difficulty is, and are not aware that there is a remedy. The subject is very often not mentioned by the patient to his dentist until the dentist has first called attention to it. Then he is usually very anxious to have something done, because of all the petty annoyances connected with the mastication of food, this one of faulty contacts is the worst, and when it is known how serious the results may be there should be the heartiest co-operation between the practitioner and the patient to remedy the evil.

It is indeed fortunate for the safety of many teeth that our patients are becoming more and more sensitive to the irritation of food in the interproximal spaces, and will often at once make complaint when this trouble begins, and I am frank to confess that it sometimes taxes the ingenuity of the operator to overcome the difficulty. However, no amount of effort should be considered too great to be expended upon the problem, and this problem involves two important considerations, each one of which should be taken up separately. One is faulty form of the contact point on the tooth affected, and the other is faulty form of the occlusal surface of the occluding tooth on the opposite jaw.

Normal Contact. It is obviously unnecessary to deal at length before this Society with the normal form of the contact point on the approximal surfaces of the human teeth. This we have become as familiar with

as we are with our dental anatomy. However, a re-emphasis of a few points may be profitable to us all. In order that fibrous food may not be retained between the teeth, it is obvious that the area of actual contact must be exceedingly small, and that the form of the contact point shall be somewhat sharply rounded. This may not convey to the average observer an accurate idea of the actual form to be found on the approximal surfaces of normal teeth, particularly the molars. The buccolingual width of the teeth would give the impression that the contact on the approximal surfaces must be more or less flattened, and this impression seems to be substantiated by the ordinary method of examining them.

If we look into a mouth with a full complement of teeth we see these broad molars apparently in contact for some distance bucco-lingually, but this is really not the case in all normal conditions. The deceptive thing about it is that when we look into a mouth under these conditions, the interproximal spaces are filled with either gum tissue or foreign matter, or saliva. These tend to a larger degree to obscure the contact point. The only accurate way to determine the exact area of the contact point is to take two extracted molars and place them side by side in the same relation which they occupied in the mouth, and then hold them up to the light. The area in which vision is obscured by the contact will give the actual area of that contact and when this experiment is tried it will be found that even on teeth so broad as molars the area in actual contact is almost infinitesimal.

In making such statements as the foregoing it must be borne in mind that reference is made to ideal normal contact. We see practically every day cases of broad contact caused by the wearing of facets in the approximal surfaces of the teeth through the individual movement of the teeth one against the other, but this is clearly an abnormality, and should not be considered in this connection except for the lesson learned therefrom. If the enamel of the human teeth can be worn to the extent we often see it, then it is apparent that the hardest of our filling materials is none too hard to withstand this wear, and the lesson is that we shall make the contact point on our fillings as dense and hard as it is possible for them to be made.

Contacts with Gold Inlays. This last thought of small, narrow, rounded and hard contacts naturally leads us to the consideration of the cast gold inlay, but as I understand that subject is to be taken up separately, and handled much more ably and exhaustively than it would be possible

for me to do, even though I could take the time, I will consider the subject of the gold inlay only as to its direct bearing on the subject under consideration, leaving the full discussion of the gold inlay in the very able hands of my esteemed colleague, Dr. Conzett, whose authority to speak to us on this very interesting subject can be doubted by none of us who has the slightest acquaintance with him or the great work he has done along the lines of operative dentistry.

First, by the use of the gold inlay we are able more easily and with less inconvenience to the patient to make contacts that are more true to Nature's plan than we can by the same form of fillings built in teeth in the mouth. By this I do not mean to assert that our best operators cannot and do not obtain perfect contacts on foil and amalgam fillings. We have all seen too many beautiful and perfect restorations to allow of any such argument, but I do mean to assert that the rank and file of operators with the rank and file of patients will obtain good contact with



greater ease and more certainty with good inlays than with fillings.

Nor must we overlook while considering this subject the importance of the occlusal surfaces in our restorations, and we must see that we have in no wise neglected our duty there, no matter what the occlusal surface be, whether it be made of gold, amalgam, or porcelain, or whether the lost portion be replaced with a crown of some kind. That portion of our endeavor which pertains to the chewing or grinding surfaces should be given our utmost consideration and skill in the carving of the cusps, inclined planes, grooves and sulci which go to make up the restored chewing surface, the better to engage the food and make possible the function of thorough mastication, instead of leaving those smooth, wiped, characterless surfaces which we see altogether too frequently.

In former years there may have been some excuse for these very important details not being restored in an ideal and normal manner, but since the advent of the quick-setting amalgam, and that last great boon to humanity, the cast gold inlay, there can be no excuse for any operator who fails to restore any tooth to its fullest possibility as a masticating organ.

Restoring Position of Ceeth Before Filling.

In this connection there is another point that I want to bring to your attention in our operations on these cavities in the approximal surfaces, one which to my mind deserves our very careful consideration. This relates not only to the form and area of the

contact point, but also to the mesio-distal width of the filling or inlay. Usually when a tooth decays sufficiently to involve the contact point the teeth drop together, and this affects not only the two teeth immediately concerned, but it causes a loosening of the contacts on several adjacent teeth. To bring about a proper restoration of the arch on that side again as it should be, involves not only the wedging apart of the affected teeth, but through this means a tightening of the adjacent teeth. Then the filling, or inlay, should be given such a form that this tight contact between all the teeth shall be maintained, and in order to do this it is necessary to make it the full mesio-distal width of the original tooth, and in cases where the arch has been much loosened this width should be somewhat exaggerated. This tightening up of the arch is of the utmost importance, as it gives a stability to the entire side of the jaw, which usually has been lacking since the breakdown of the original contact point.

Two methods may be employed to obtain these results: first, either gaining slightly more separation than is needed, with the accompanying extra tightness of the rest of the affected contact points, and making the inlay of the correct mesio-distal width, when it will slip into place with-

out binding; or, second, by obtaining rather less separation than is required by existing conditions, and forcing the inlay to place with blows of the mallet. Personally, I prefer the method first described. I believe, if anything, it is more exact and definite; also it is easier both for the patient and the operator to try in and fit an inlay which does not bind on the contact point than one which seats with difficulty on account of binding at the contact point, and the further fact that where an extra amount of separation has been obtained the soreness of the teeth caused by the separation will immediately begin to quiet down upon the permanent setting of the inlay, while in many cases where the inlay is forced to place by blows from the mallet, the fina! separation is quicker and the soreness is temporarily increased.

One thing that must not be overlooked, whichever method is followed, is that there may be a slight change in the position of the teeth. In this way the occlusal relations are sometimes slightly interfered with to the extent of making a cusp impinge too hard against the opposing tooth, with subsequent soreness on closure. It may be necessary under these conditions to grind the offending cusp slightly to relieve the undue stress. In all of our operations this factor of normal occlusion must not be ignored, in fact, must be always borne in mind by the operator, which brings me to the second consideration connected with the problem of maintaining comfortable mastication of fibrous foods, namely the form of the occluding tooth.

We find sometimes cases where patients will complain of food packing between the teeth even when the contact seems normal. This usually happens at times when the troublesome members have never developed decay, and where the contacts seem satisfactory. It also occurs occasionally after we have done our utmost in the way of normal restoration of carious teeth, and unless we understand the cause, it is not only uncomfortable to the patient, but very disconcerting to the operator. The fault is usually with the form of the opposing tooth. The sharp point of a cusp impinges between the affected teeth in such a way as to spring them apart on closure of the jaws and carry fibrous particles into the interproximal space. The remedy is extremely simple and usually brings almost instant relief, though occasionally in cases where the food has been lodging for some time it requires a reasonable period for the teeth to become firm enough not to spring apart.

An easy and accurate method of ascertaining just which cusp of the offending tooth is causing trouble, and also just how much should be ground off, and what shape to give it, is by taking a bite in modeling compound and making plaster models of the case for study and comparison. This gives an exact guide to work by, and no hesitation should



be had in grinding a cusp under these conditions, and change it from a sharp wedge shape to a blunt grinding form which will not spring the teeth apart on closure of the jaws.

Another method, though not so definite nor accurate, but one that will many terms serve our purpose well, is the use of carbon paper to detect the cusp that is causing the trouble.

This entire subject of keeping our patients comfortable for mastication, so that this function may be performed in its fullest efficiency, is worthy of our most careful consideration as practitioners, and no matter how perfect our work may be otherwise, with margins above reproach, with density satisfactory and anchorage adequate, we have utterly failed in our best service to the patient if we have ignored this fundamental factor of proper contact. This is my apology for devoting so much of your time to the discussion of what might be called a reconsideration of the contact point.

Efficiency.

By Geo. R. Warner, M.D., D.D.S., Grand Junction, Colorado.

Read before the Colorado State Dental Association at the annual meeting in

Manitou, June 25, 1914.

To my mind the best definition of the word "Efficiency" is the one given in the Standard Dictionary: "The power that accomplishes a desired or designed work." In further explanation it says: "Efficiency brings all one's ability promptly to bear on the thing to be done."

Efficiency has been reduced to a mathematical formula by someone, which formula reads:

Efficiency =
$$\frac{\text{Achievement}}{\text{Standard}}$$
, or: $\frac{\text{Achievement}}{\text{Standard}}$ = % of Efficiency.

This latter formula would indicate that one's efficiency should be judged by a standard, which I believe is true, and, if one is judging one's own efficiency it will be necessary to change the standard from time to time, for our power to accomplish a desired or designed work should increase if we bring all our ability promptly to bear on the thing to be done.

We have heard so much in the last few years about efficiency and efficiency experts, that possibly some of us have come to think that it is a new thing; or that a new application of the meaning of the word has come to pass; or possibly we may have the idea that it applies especially to large affairs. But this is not so. It is not a new word, nor has there

been any new application of the meaning of the word. Moreover, it does not relate only to large affairs. In the world-old effort to reduce cost and increase output there has been developed of late a more general or more systemized effort toward this end, and in this age of specialization this has resulted in men making a profession of this work, calling themselves "Efficiency Experts," their work being that of producing greater efficiency in manufacturing plants, railroad systems and other large corporations, city management or wherever they find a field for their services.

No doubt this specialization has resulted in a better systemization of the organizations which have availed themselves of the services of these experts. I call to mind many instances where the practical application of psychology, photography, physics, mathematics and other of the arts and sciences has resulted in very marked benefit to the manufacturing plant, railroad, city or whatever organization has systematically used them with the idea of increasing efficiency.

We should not, however, have the idea that greater efficiency can be obtained only by the aid of efficiency experts, nor that it is applicable to, or practical only in large organizations. No! Look at the definition again: "The power that accomplishes a desired or designed work." That cannot be confined to any man or set of men. It applies just as truly to the woman doing her housework, the man working in the field or the dentist at his chair, as to the large manufacturing plant, the great railroad or the city with a million inhabitants.

So let us pay no more attention to the efficiency of the so-called "Efficiency experts," but come to our own profession and ourselves—be our own experts in this matter.

Efficiency in Dentistry.

The first essential to becoming an efficient dentist—as I look at it—is natural aptitude. Just where to draw the line between natural aptitude and acquired ability in dentistry is hard to say, but I be-

lieve that it is essential for a dentist to have a taste for mechanics, or the "mechanical sense," and an artistic eye. It is possible that all the other qualifications may be acquired.

The next essential is thorough preparation, first in elementary schools, then in secondary schools and possibly in college or university. I say "possibly in college or university" because it is not clear in my mind whether the loss of college training may not be offset by the advantage of training the hands in dental technique that much earlier in life. If the training of the hands could be started early in the teens it would be an immense advantage.

Then comes the dental college training, which cannot be too care-

tul and thorough, but, just how broad the course should be or how many years should be spent in it I would not attempt to say. But no matter how long or thorough the dental college course, it should be supplemented by a period in a dental office under the supervision of the best man possible. This gives the young man an intimate knowledge of practical methods of practice and the business side of conducting an office, that will be of inestimable value to him in developing his own efficiency.

Now that he is ready to start out on his own responsibility after the best preparation possible in his case, what is of the next importance? To my mind it is keeping the machine in good running order. The human machine is like one built of steel; it should be kept in the best possible condition to develop its greatest efficiency. Our profession is very exacting in its demands on the man. No matter how liberal Nature has been to us in regard to good health, most of us begin to feel wear after ten years of active practice, some more and some less, but, we should make the most of what we have. We must necessarily work under unnatural and trying conditions—conditions that tend to break down the physical man rather than build it up. We must, therefore, take greater care and precaution to keep ourselves in good condition than the man who works out in the open, or the man who is not so unremittingly under a nervous strain.

The dentist, in order to keep up to the highest efficiency, must be temperate in all things. He must have regularly a full allowance of sleep. He must take regular, and preferably out-door exercise. He must refrain from the use of all drugs and stimulants, which, of course, includes tobacco. He must by all means have a good vacation every year, and I most thoroughly believe in the five and a half day week of not to exceed eight hours per day.

Besides these things that have been mentioned, the body cannot be kept in good condition unless the mind is right. And one of the most potent things in breaking down the body and mind is worry. Now you know that the best definition of worry is "Fear." What should an honest, conscientious man fear? Nothing. But that is just the trouble with worry; it seizes on foolish little things that no normal, healthy man should fear. Face the situation squarely, if you are one of the worriers. Have it out with yourself. Then, when you impress upon yourself the foolishness and futility of worry, stop it at once, increasing your efficiency many fold thereby.

Value of Continuous Study. Now, after a thorough preparation for our work and having and keeping our minds and bodies right and in the best working order, what should we do further to develop our efficiency? It seems to me that study is the thing of most importance. It makes no difference how bright we are naturally, how well prepared we may be, how hard we studied or how high we stood in college, if we do not keep on studying after we enter practice. If we do not keep on studying we soon become stagnant. We must study to hold what we have as well as to acquire new. We should study text books as well as dental journals and new books of reference. Study along allied lines is also helpful in our work as well as being broadening in its effect.

Next in importance after study of current literature and text books I should put, attendance upon society meetings, and attendance upon society meetings is quite as truly study as the perusal of text books or magazines; indeed if you have to listen to papers like this it is about as hard and unpleasant study as you can engage in. But generally speaking, it is study in a pleasant, palatable and easily digestible form. Short papers, clinics, and most important of all, talks with the good fellows who usually frequent these meetings, all go to constitute study that is the most interesting, inspiring and lasting of all. And in this connection, let us not forget that one of the greatest benefits of study of any kind is to tell what we have learned to someone else. So if you are ever invited to read a paper or give a clinic, be sure to accept the invitation, because even if no one else gets much benefit out of your effort you will get a great deal yourself.

Another way to study is to visit the offices of other practitioners and with our eyes and ears open, absorb everything possible.

Now, after having learned things in these various ways, it is an essential part of efficiency to apply them to our own practice. We must carefully and thoughtfully go over what we read, hear and see, reject what we are sure we cannot use, try tentatively what we are doubtful about and adopt what we are sure we can use with benefit. This requires fine discrimination, but such discrimination comes with practice, and if we are humble enough to receive an idea wherever it may come from and honest enough with ourselves to carefully weigh it before adopting or rejecting it, we will soon develop a power of discrimination and assimilation that will increase our efficiency most markedly.

The enthusiasm we gain from study and association with our fellow practitioners increases our interest in, and love for our work, and certainly the word efficiency will never apply to a man who does not love his work.

Cocation and directly to the man himself, which, of course, is of first importance. But there are other things to be considered in connection with the efficiency of the dentist, viz., location, office and equipment. The location refers to the



town as well as to the place in the town. Some men will reach their highest efficiency in a city and others in the smaller places. Some fit the environment of one part of a city some another. So a man should know himself and place himself where he can work to best advantage.

Having decided on the location, we come to the office. Allowing for all differences due to the climate, size of the town, class of practice, temperament of the operator, etc., the office should be well lighted and ventilated, and as roomy and convenient as circumstances will allow. The reception room should be simply furnished, admitting of frequent and not too difficult cleanings. The operating room and laboratory should be arranged to best facilitate the work of the individual operator, and arrangement and rearrangement should be carefully thought out with the idea of increasing the operator's efficiency.

As the actual work on the patient must be done by the operator himself he must use every means to make each minute of his own time count to the greatest advantage. To that end an office girl or secretary should be employed as early in our practice as we can possibly arrange it. We should learn to let that person remove every possible burden from our shoulders.

As the practice increases we should arrange for an associate or laboratory man. If we have a genius for organization we may be able to build and maintain a practice for several men, dividing the work into specialties, thus increasing the efficiency of each individual as well as of the whole organization.

The equipment should be as carefully considered as the office, and whether it be furniture, instruments or appliances they should be bought if needed, but the need should be clearly demonstrated. To my mind it is quite as detrimental to efficiency to have a lot of useless stuff around the office as to have too little. Do not be afraid to say "No" to the overpersuasive salesman, and do not be afraid to invest in a thing after you have decided that you really need it.

Che Business Aspect. Last, but not least, is the business side of the practice. Each man must decide for himself as to the fees he will charge, but whatever they may be he should collect them. And they are never so easily

collected as the minute they are due. Do not be afraid to be business-like about your practice. People respect you more for it. Moreover, you should not only be prompt in collections but you should exhibit the same promptness in paying the bills that you owe. It is most detrimental to your practice to be worrying about collections, and it is equally or even more detrimental to have people harassing you about your unpaid

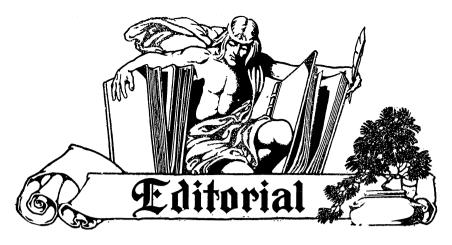
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bills. So be methodical, prompt and business-like about your practice, as it will mean much for your efficiency.

But, you say, all this efficiency business is mighty hard on a fellow; it keeps the nose of the poor dentist right down on the grindstone; it means a life of sacrifice; it means hard work, constant work, without much chance for the so-called pleasures. I grant you that, but if one is to accomplish much in this world, constant endeavor is essential. But what pleasure is there so satisfying, so enthralling, so full of real joy, as that which comes with work, work well done, work that rounds out years of preparation and is the final accomplishment of a purpose? This is at once the pleasure and reward of Efficiency.





The Creatment of Pyorrhea from the Viewpoint of the Patient.

A general practitioner of dentistry, residing in Brooklyn, during the past twelve months has received two letters from patients dealing with their individual experience in the hands of pyorrhea specialists, which are so illuminating that they are herewith presented for the moral effect which they may have. The first letter, dated August 2, 1914, reads as follows:

"My dear Doctor:

Letter from Patient.

"You will be interested to know that at last pyorrhea is claimed to be permanently cured. I have just taken the treatment given by Dr. V., of Paris,

who guarantees that my gums are now absolutely healthy and free from all pus, and pockets will remain so.

"First, a culture was made from the pus by the doctor from the Pasteur Institute, and twice weekly for four weeks I received an injection of 'bugs' in progressive quantities, the last three being each two billions.

"Then twice a day for twenty-one days my roots were scraped and cleaned and the gums treated with various drugs until they finally were of that pale pink healthy hue that I never expected to have. It would pay you to have your assistant come over and get in touch with Dr. V. I met dentists from Milwaukee, Chicago and Philadelphia who knew and spoke highly of you, who were investigating at V.'s office this cure, and who marvelled at the success he had with my gums. They were en route to the International Dental Conference at London, which is to be held this week, and at which V. presents a paper on pyorrhea. I am inflicting this letter upon you because I am interested in you, and because I feel sure you will be interested in it. Hoping you are having a pleasant summer, and with my best regards to you and yours, believe me,

"Most sincerely yours."

It is evident from the above that this patient has been treated with an autogenous vaccine; that his gums had become more healthy and that he was delighted with results. He evidently considered that he had obtained such treatment in France as could not have been received in America, since he advises the practitioner to send his prophylactic assistant (who, by the way, is exceptionally skillful) to learn this method of cure.

The interesting feature of the treatment is its comprehensiveness. The patient not only received injections twice weekly for four weeks, but after that the roots were cleansed and scraped and various drugs applied to the gums twice daily for twenty-one days, till his gums had a healthy hue that the patient had never expected them to have. The natural query arises, was it the vaccine injections which effected the cure, or the forty-two sittings of cleaning and scraping, or the drug application? Or was the result dependent upon all these together? The writer confesses that he is confused, and finds it difficult to determine the due proportion of merit attributable to each part of the treatment. It is not worthy, however, that this case appears to have been cured without emetin.

(N. B.—Since sending the above to the printer, the writer has learned that this patient has presented recently with pus oozing around several teeth.)

The second patient, "treated in America," received quite as many kinds of treatment, but with less benefit, judging by his letter, which is as follows:

"My dear Doctor:

Tetter from

Mnother Patient.

"I have had so much work done on my teeth
with apparently anything but beneficial results that
I am writing you to give you a little history of my
case, as it may possibly be some aid in treating me.

"Practically all of my teeth have ached for the past two or three years. There were no cavities. However, Dr. H., of Philadelphia, (dentist), thought that it was a gouty condition, and could probably be cured by removing the nerves and cleaning out any foreign deposits at the roots of the worst teeth; at the same time treating them with an electric battery. He also took some pus from the roots and made a serum and gave me a hypodermic injection every week for three or four



months. At the same time he had me drink about two quarts of water per day. These efforts may have helped, but they did not cure.

"Dr. H. was guided somewhat by Dr. S (physician), of Philadelphia. who had had me in the hospital for intestinal trouble. Both the dentist and the physician thought that my trouble with my teeth was due partly to my intestinal trouble.

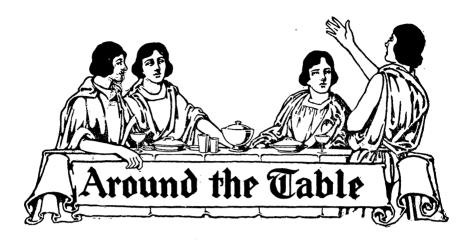
"I later went to Dr. B (dentist), New York. He treated my teeth for three or four months with no results. He sent me to Dr. H. (claimed to be a pyorrhea specialist), New York, who, so far as I know, did me no good. Dr. B. then sent me to Dr. R. (physician), New York, who claims that my trouble with my teeth is all due to my intestines. I have been following his prescriptions and diet for nearly a year, perhaps with some good results.

"I am certain that the dentists wasted a great deal of good time filing and sawing at my teeth. They have filed them down to such an extent that they are practically smooth and greatly reduced in usefulness. "Very truly yours."

What comment shall we make on this second letter, or upon both together? They are both written by intelligent, successful business men. In the first case the patient is delighted because he considers himself cured. Perhaps he is. Let us hope so! It is not to be overlooked, however, that despite his description of details of treatment, which assuredly was strenuous enough, not a word does he say about any home treatment which he must himself apply if his present state of health is to be maintained.

In the second letter, the real names of all the dental and medical men are widely known. They are all prominent men. Yet we find them all undertaking to treat a condition which they all individually and jointly have failed to control.

Elsewhere in this issue we make an appeal for a sane and sanitary method of bridgework. May we not ask the pyorrhea specialists likewise to arrive at some sane and scientific mode of treatment of pyorrhea? And in view of the systemic poisoning said to result from uncured pyorrheal pockets, would it not be saner to extract the incurable teeth promptly? Of course, the extraction fee would be less, but is not such a letter as the above a serious arraignment of the dental profession? And does anyone doubt the accuracy of the picture drawn by this sufferer?



"HINDSIGHT IS BETTER than foresight," cried the man running away

- from a mad dog; but, "foresight is better than hindsight, by a good
- sight," said the girl crossing a bull pasture, as she removed her red
- sweater.

IT WAS ONLY A FEW YEARS ago when the dental profession of this

- country almost suffered mental rabies because attacked by Dr. Hunter,
- upon whom they looked with little less love than were he a mad dog
- indeed. Many truly believed that his accusation that American dentistry
- was septic dentistry, was an unwarranted diatribe against the work and
- workmanship of the dentists of the United States. When the truth was
- * known, it became apparent that Dr. Hunter had used the term American
- dentistry, written thus: "American dentistry," and by it he meant that
- style of dentistry, mainly crown and bridgework, practiced by the
- Cheap-Johns of England and advertised to the confiding public as
- "American dentistry."

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THUS IN TIME the excitement in this country died down. Dr. Hunter did

- ❖ not mean us after all. He meant "American dentistry" with quotation
- marks, not American dentists, the simon pure.

BUT A FEW of the more scientifically inclined and more thoughtful among

- us, did not find comfort quite so easily, and these men have practiced
- * "hindsight" so thoroughly, using the all seeing X-ray to obtain the in-
- sight into the results of past efforts in crown and bridgework, and this
- hindsight has produced such appalling pictures, such evidence of septic
- conditions hidden under bridgework and crownwork admittedly "Made-
- in-America," that it has been more than proven that American dentistry
- (without the quotation marks) has been sadly at fault in the not distant
- part.



FROM THIS RETROSPECTION, has come introspection with the result-

- * ant verdict that in the future American dentists, at home and abroad,
- * must use more circumspection. From this hindsight is born the need
- of more foresight.

H H

EVIDENCE ACCOMPANIED by radiographic proof of conditions was pre-

- sented in the July "Items of Interest" by Dr. Byron C. Darling, a medi-
- * cal man practicing radiography as a specialty. But a more direct in-
- * dictment was handed down in the August issue by Dr. Morris I. Scham-
- berg, a dental and medical graduate practicing oral surgery.

H H

IN A RECENT PRIVATE conversation Dr. Schamberg was asked: "Grant-

- * ing that serious systemic infectious diseases are frequently accompanied
- by septic conditions under and around crowns and bridges, what real
- * proof is there that the oral condition was the primary cause of the dis-
- tant diseases?"

H H

"MUCH REMAINS TO BE done to clear up this whole question," replied

- Dr. Schamberg, "but there is one significant fact which makes a tre-
- mendous impression upon the internist in hospital clinics. That is that,
- not occasionally, but frequently, serious body lesions resist every man-
- ner of treatment, and then when the oral infection is discovered and the
- teeth extracted or the mouth infection cured, the systemic symptoms
- disappear with magic-like rapidity."

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IN THE SAME general strain is a letter from Dr. T. B. Heckert, of Wayne,

Neb., from which the subjoined is quoted.

"I WONDER," writes Dr. Heckert, "If you would not discuss Around the

- * Table this question: "Is it possible to make a really sanitary crown or
- ❖ bridge?"

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"RECENT INVESTIGATION," he continues, "in regard to infections origin-

- * ating in the mouth has caused a radical change in the opinions of many
- honest dentists as to the value of this class of work, even though none
- of us doubt its usefulness as an aid to mastication and for the restora-
- tion of broken-down teeth.

H H

"IN NEARLY ALL DISCUSSIONS that I have heard upon this all impor-

- tant matter, the stand has been taken that it is only poorly made
- * crowns and bridges that are unclean, but when we examine the work
- of honest and skilled men, after being in use for several years, we are
- tempted to believe that all crowns and bridges are unclean, the main
- difference being that some are more so than others.

H H H

"I BELIEVE WE ALL have been conscientious in the past in recommend-

- ❖ ing and constructing this class of work, but in the light of our present
- * knowledge are we justified in continuing to do so?

"THE EVILS OF THE shell gold crown, so frequently used in the past to

- * avoid a large operation, has been greatly minimized by the advent of
- the casting process. Now that we have the cast gold inlay, we can re-
- store single broken-down teeth with less labor and with better results
- for the patient.

"BUT FOR THE BRIDGE we have no substitute except the partial plate

- denture, with all the problems which that brings to us in the way of
- clasps. On the other hand if we abandon crowns altogether, we must
- also dispense with the removable bridgework which relies for its reten-
- tion upon some form of attachment to the abutment teeth.

"WHILE THE OLD-FASHIONED partial plate is not so serviceable for

- mastication as the modern bridge piece it was at least possible to keep
- it clean and sanitary, and we cannot detect any unholy odors from such
- a piece when the patient is of reasonably cleanly habits. This, of course,
- is, in a less degree, true of removable bridgework, but it is not true at
- all of fixed bridgework, and fixed bridgework being less costly, is in
- more demand and in more general use than removable pieces, which
- latter require intricate and difficult attachments, if made successfully.

"I THINK THERE IS little doubt that the increased income which crown

- and bridgework has brought to the dentist, has had some influence in
- establishing it in its present popular place in dental practice, and for
- this reason much outside and inside pressure may be needed to bring
- about its abandonment.

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"IT IS CERTAINLY a sad state of affairs when a supposedly learned pro-

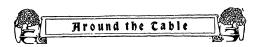
- fession must be checked up by outside influences. We have been asking
- the medical profession to take more interest in dental practice, but when
- they do we find ourselves under grave suspicion of having promoted
- those very dangerous conditions which we have so loudly condemned.
- Has not the time arrived for a little self-examination?"

DR. HECKERT'S LETTER is a trumpet call in clarion tones. It is a call

- to the crown and bridgeworkers of this country to "clean house or
- move out." What will their answer be? I ask what will their answer
- be-because they must make reply. Ever since Hunter's articles on
- oral sepsis, a small band of devoted men have been attacking the serious
- problem of root canal treatment, and already such progress has been,
- made that a more perfect root canal technique has been established
- which will continue to improve until the profession will have mastered
- this problem, quite as well as has any surgical procedure been standard-
- ized for any other part of the body. Aye! Even more so!

THE MOST DIFFICULT part of the bridgeworker's problem therefore is

- approaching solution, and in this particular part of his work his duty
 - becomes obvious. Either he must master the technic of root treatment



- . and filling, or else he must refer that part of the treatment to some
- other man, and only start the construction of his bridge, after the root
- specialist has finished making the abutment teeth free from infection
- and practically free from the danger of future infection.

H H

IN THE PRESENCE of teeth affected by pyorrhea, the theory that loose

- * teeth utilized for bridgework, will "tighten up," has been finally dis-
- * proven. Such teeth do not regain health merely by the support ren-
- * dered either by fixed or by removable bridges. Abutment teeth should
- be in a state of health prior to any attempt to use them as supports for
- * bridges. If they be diseased therefore, the disease should be eradicated
- . before the bridge is even planned. No other course is fair to the pa-
- tient.

H H

AS IN ROOT CANAL treatment, if the bridgeworker cannot cure the pyor-

- * rhea, he should refer his patient to a specialist for treatment before un-
- . dertaking any bridgework.

H H H

BRIDGEWORK OF THE FUTURE must be sane and sanitary. It is never

- sane to attach bridgework to diseased teeth. This, at least, is a founda-
- tion principal that may be adopted at once. The problem of making
- bridgework sanitary is not unsolvable, and therefore the bridgeworkers
- * must attack this problem and they must solve it.

H H

GRANTING THAT bridgework should only be placed in healthy mouths

- and supported upon healthy teeth, there still looms up three grave as-
- * pects to the bridgeworker's problems.

H H

BEGINNING WITH THE mouth and teeth in a state of health, how shall -

- . he constuct and retain a bridge without danger of inducing a diseased
- . condition? While utilizing teeth for the retention of his piece, the
- * bridge itself should be so constructed that while the abutment teeth
- shall act as efficient retainers of the bridge, the bridge itself shall sup-
- * port the abutment teeth against all undue or unnatural stress, while at
- the same time allowing the abutments that movability which is es-
- the same time anowing the abutineness that inovability which is es-
- sential to maintain the pericemental attachment in a state of health.
- ❖ Briefly put, either too much movement of a tooth in its socket, or too
- much rigidity, will induce disease through trauma.

H H H

SECONDLY, THE BRIDGEWORKER must decide whether or not to re-

- * move pulps from healthy teeth, or use them with pulps alive. Where
- pulps are left in abutment teeth, the problems will be, whether the inlay,
- * Carmichalel collar, or clasp will not eventually induce disease of the
- pulp, death of the pulp, and infection of the periapical area. Teeth thus
- used in bridgework, without pulp removal, belong to that great class
- which "never gave any trouble afterward." No! The teeth do not give
- any trouble; but the infection occurring in the form of blind abscesses
- æ we are now told are contributing causes of arthritis and other serious sys-



- temic lesions. Hence if we leave the pulp alive, the bridgeworker must
- . be prepared to prove by radiographs two, three, or five years afterward,
- that his living pulps have not since died, and that his non-troubling
- teeth are not seeping poison into his patient's system.

H H H

WHERE THE BRIDGEWORKER decides upon pulp removal, he must re-

- member that just as soon as pulp removal is practiced, the door is opened
- * for periapical infection. The operation therefore must be through, and
- it must be skilfully accomplished. The healthy periapical tissues must
- * not be injured nor infected during the process; all pulp tissue must be
- removed, and all of the canal or canals so thoroughly and so aseptically
- * filled that the danger of future infection should be reduced to the
- minimum.

H H H

THEN TOO IT SHOULD never be forgotten that a pulpless tooth is no

- longer in a state of full normal health and strength. The dentine of
- such teeth frequently in time lose vital resistance to stress and fracture
- more easily. Hence in the construction of the retaining attachment,
- while using the tooth to hold the attachment, the attachment itself
- should be so made as to protect the abutment tooth against fracture in
- the future.

H H H

THE ABOVE ARE the main problems and the chief aspect of the problems

- * which confront the bridgeworkers of this country. In the very recent
- * past we have heard little from these gentlemen save an occasional con-
- tribution to the purely mechanical construction of crowns and bridges.
- * Will they now join forces, do a little research work and unite to es-
- * tablish a sane and sanitary system of American bridgework, which shall
- be free from any possible criticism by pathologists or physiologists?

H H

FOR THE HONOR OF AMERICAN dentistry this must be done, and we invite and will welcome discussions on this topic.





Samuel Smith Nones, D.D.S.

Dr. Samuel Smith Nones died of Bright's disease June 10, 1915, at Narbeth, Pa., and was buried at Wilmington, Del., on June 12th. Dr. Nones was born on Staten Island, N. Y., April 22, 1837, and therefore was 78 years of age at the time of his demise.

On January 15, 1863, Dr. Nones married Harriet Alexander Hodgson in Wilmington, Del., who died May 8, 1882. In 1885 he married Elizabeth Cooper, who died September 29, 1907.

Dr. Nones was graduated from the Pennsylvania Dental College in 1859. Practiced his profession in Wilmington, Del., till 1864, when he moved to Philadelphia, where he practiced till a few years prior to his death. He was one of the charter members of the Pennsylvania Dental Society.

Two sons, Drs. Robert H. Nones and Henry B. Nones, and a daughter, Mrs. Ida Wiley, by his first wife, and Albert C. Nones, by his second wife, survive him.

With his son, Robert H. Nones, and his grandson, Robert H. Nones, Jr., Dr. Samuel Smith Nones conducted his office under the probably unparalleled conditions of having three generations in practice together.

Eugene A. Johnson.

Whereas, It has pleased our God and Manager of all things to remove Eugene A. Johnson by death. The commonwealth has lost a worthy citizen of the highest type, and our profession an eminent and highly respected member, who throughout his career was ever among the foremost in working for the advancement of his fellowmen.

Dr. Johnson was an earnest worker for higher ideals in dentistry. He was an earnest and forceful teacher and was highly appreciated by his confrères in the faculty of the University of Tennessee College of Dentistry, with whom he had been associated for several years.



In all professional and society work his council and ability to perform were greatly appreciated. By his death the Memphis Dental Society feels that it has sustained an irreparable loss.

Therefore, we do resolve to give expression to our sorrow and feeling of loss caused by the sudden culmination of this brother's noble career. We also wish a copy of the above sent to the bereaved family and to the journals for publication.

J. D. Towner, D. M. Cattell,

